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THE CARE OF THE AMBULATORY ACCIDENT CASE.*

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FOR a number of years I have had much to do with emergency accident work, as seen in both office and hospital service, and since July 1, 1912, when the Workmen's Compensation Law of Massachusetts became effective, this work has very much increased. It is because of this extended experience that I chose to bring this subject to your attention, and I trust that it may prove the seed from which something will grow in the way of discussion that will prove of value. Nothing new is offered, I am sure, in the consideration of this subject, either in the management of the cases, or in the treatment of the various conditions of injury which arise. There are some observations which I would make, however, which to me have seemed somewhat important and not perhaps sufficiently appreciated by some of those who are called upon to care for this class of surgical work. If one is to be successful in the management of this particular kind of work he must be willing to make many sacrifices, for his most cherished plans will be completely disarranged times without number:—he must be reasonably prompt in rendering service, the injured person may be content to wait a reasonable length of time, but his friends and co-workers will never listen to delay; he should be able to obtain and keep fairly accurate histories, for many times upon this depends the payment of the amount of compensation; he should have reasonably good business ability and system, and should take particular pains to forward promptly his reports of accidents and his bills for services rendered. That he should have tact and good surgical judgment goes without saying. Experience is, of course, a very essential factor in the proper handling of the accident case, and placing it at the bottom of the list of desirable qualities specified, does not in any degree minimize its importance, but rather tends to lay especial emphasis upon its necessity.

Probably there is no quality possessed by the accident surgeon which is of so much *importance* as this in getting the injured man back to his work in the shortest possible time and in the best possible condition.

The surgeon's duty, therefore, is two-fold: first the duty to the injured man, who should be guaranteed the best possible service both in promptness and in skill, in order that his return to health may be brought about in the shortest possible time; second, to the employer, in promptly notifying him of the extent of injury, of the probable duration of the disability, and, by no means of least importance, of the manner in which the injury was produced, in language as clear, plain and concise as possible. This report, promptly received by the employer, can at once be forwarded to his insurance company. Prompt handling of such reports by the attending surgeon insures a minimum amount of delay in determining and forwarding compensation, if such should have to be paid. For the past two years we have provided accident

* Read at the inaugural meeting of the New England Surgical Society, Boston, Oct. 6, 1916.

reports as part of our own stationery, and this is filled out at the time the patient is first seen, and forwarded to the patient's employer, usually upon the same day that the employee is first seen. At the same time we make out a card for our own use, and upon this card we endeavor to keep a clinical history of the case until it is discharged. Fifteen days after the date of injury, a bill is sent to the employer for all services rendered the employee during the first two weeks or fraction thereof of his disability. To employers of labor not availing themselves of the benefits of the Workmen's Compensation Act, the Boston & Maine R.R., for instance, statements for services rendered injured employees are rendered on the fifteenth of the month following the discharge of such patient. Should any unexpected complication arise during the period of disability of an employee, or should the period of disability prove to be longer than was at first anticipated, a statement of such complication or prolonged period of disability is often sent to the employer, not only that he may personally know the condition of his employee, but he may also, if he so desires, convey this information to the company who insures him, for their guidance.

All this, of course, requires some clerical work, but we must remember that the present laws also require greatly increased clerical expense upon the part of the employer, and unless information relating to accidents occurring in his plant is promptly reported, he is subject to a heavy fine, in addition to jeopardizing the benefits derived from his insurance. It, therefore, behooves the surgeon who wishes to do accident and emergency work, to render prompt and efficient service to the employer as well as to the employee. So far as possible, all accident cases are cared for at the office, both for the primary treatment and for the later dressings. We dislike to attempt any treatment at the place of injury, and if patients can be moved, they are brought to our office, or if the injury is of a severe character, they are sent at once to one of the local hospitals. We feel that the results of this method are superior to anything that we would be able to obtain in treatment at place of injury. Injuries requiring an anesthetic and any extended repair work are treated primarily at the local hospital, but they are discharged at the earliest possible moment that this can be safely done. To keep a patient with a minor injury of his hand, for instance, in a hospital, is nonsense, and not likely to endear the doctor either to patient or employer.

In the primary treatment of minor wounds we are about equally divided in practice between two methods. The first method consists in a thorough cleansing of the surrounding parts of the wound, followed by a cleansing of the wound itself with tr. of green soap and water. This is followed by the application to the wound of a solution of bichloride of mercury of a strength of 1-2000, completely immersing the wound in the solution if possible. Either a dry sterile dressing or a moist borax and lavender dressing is then applied. The second method consists in the application of 3½% tr. of iodine directly to the wound and to the surrounding parts, followed by a dry sterile dressing, no attempt being made to cleanse the parts. My own personal results would lead me to favor the primary cleansing with green soap and water, followed by the bichloride solution, although we have obtained very satisfactory results with the iodine method.

We are in the habit of changing dressings as infrequently as possible, and perhaps sometimes we carry this too far. We are very fond of the moist or wet dressings in the treatment of the ordinary lacerated minor wounds of the hand and fingers, and particularly so, of the old Gamgees solution of borax, co. tincture of lavender, glycerine and water, sometimes known as borax and lavender mixture. Patients with this form of dressing seldom have redressings oftener than once in two days, and often once in three days. Very often when the dressing becomes very adherent to a granulating surface, we cut around the adherent portion, allowing it to remain, serving as an improvised scab. It is often surprising to see the rapidity with which healing goes on beneath this makeshift. It is, I am sure, superior to tearing off surface granulations every day for the simple purpose of putting on a new dry piece of gauze. This, of course, can be done only in the so-called clean wounds.

Nearly all infected and suppurating wounds are treated with a wet creolin solution. This dressing should always be thicker than the average dressing, and nearly always should be covered with some impervious material such as oil silk or rubber tissue. These dressings almost invariably have to be changed daily. As soon as the wound becomes clean and granulations begin, creolin is discontinued, and the Gamgees solution or a dry sterile dressing is used. In a few dirty suppurating wounds we have lately used Dakin's solution with very pleasing results, notably so in a dirty gunshot wound of the foot.

In those wounds resulting in a fairly definite cutting off of portions of the phalanges, we have done no re-amputating for some years, always relying upon a thick dressing constantly moist with Gamgees solution. It usually requires from four to five weeks for the end of a chopped-off finger to become completely covered in with epithelium, but the result, so far as function is concerned, seems to be perfectly satisfactory—the stump being no more tender than if covered with a palmar flap. By so treating these injuries, from one-half to three-quarters of an inch of finger is saved, and this is very important indeed.

Incised and lacerated wounds we close up as much as possible, often using horsehair for

this purpose, and usually this is done without an anesthetic. Much can be done in this way without serious complaint on the part of the patient, provided one uses the finest possible needle and horsehair; and certainly the patient's feelings should be considered.

In the treatment of superficial burns we have obtained very much better results by removing all the loose rolled-up epithelium at the primary dressing; even the blisters are trimmed off at their base. It has been our experience that the serum which collects beneath this layer of loosened epithelium nearly always becomes infected, and it is then necessary to remove it. To remove it early lessens the danger of infection and hastens recovery. In the superficial burns we have always found Gamgees solution as comfortable and as clean as anything. Sometimes just before burned areas become completely covered with epithelium, the borax-lavender mixture becomes very irritating; it must then be very much diluted with salt solution or perhaps discontinued entirely. In these cases some bland ointment for a few days seems to be most gratifying.

In all cases in which there is any question as to bone or joint injury, and in all cases of unmistakable fracture, radiographs are taken and the plates preserved. It has been our intention for the past two or three years to have a radiograph taken of every bone injury at the time the patient is discharged from our care as recovered, and also whenever a patient with a fracture is transferred from our care to that of another surgeon. This is done as a protection to ourselves, and we would most heartily commend it to all who have anything to do with fractures. We do not intend to undertake the care of a fracture without a very definite understanding that it shall remain under our care until its final and complete recovery. We do not think that any surgeon is justified in adopting any other course unless he is able and fortunate enough to refer the case to some one of known competency.

The proper treatment of fractures requires more careful, painstaking work than almost any other type of accident, and it carries with it greater danger to the reputation of the surgeon than almost anything else that he does. We are constantly impressed with the fact that the profession in general have not a proper appreciation of the seriousness and importance of these unfortunate accidents, and this is due, without any question, to the lack of sufficient training in the subject in most of our medical schools. It is a gratifying sight that so much space in our medical journals of the present day is given over to the subject of fractures, very much more than five years ago, and it would seem as though the subject were attaining the importance that it really deserves.

As stated in the beginning, these are observations which have been impressed upon us by our own experience, and are so given to you. Personally, I am particularly impressed with the necessity of good and prompt business methods in dealing with this class of work. I feel that the profession are blamed many times, and justly so, for their failure to realize this. The statement that "the doctor is an awfully poor business man" is all too commonly heard. We should emphatically contradict this by adopting better business methods and by greater promptness in our relations with employers of labor.

DISCUSSION OF DR. STETSON'S PAPER.

DR. CHANNING C. SIMMONS: Dr. Truesdale has kindly asked me to discuss Dr. Stetson's paper. While I consider the Workmen's Compensation Act is very important in its relation to the physician, I do not think that the average surgeon in Boston sees many of these cases. Most go to the larger hospitals, and I will try to tell you how they are handled at the Massachusetts General Hospital.

Since the establishment of the Haymarket Relief Station there are on the average five thousand cases a year treated in the Accident Room, of which there are from none to nine industrial accident cases a day. In the month of August, for example, there were 89 industrial accident cases treated. These cases varied from a slight bruise to a compound fracture of the skull, but most were ambulatory and the injuries comparatively slight. A brief history is obtained in every case, which is important for both the hospital and the insurance company. The name, occupation, place and time of injury, and disposal of the cases is also noted. The blank filled out is very similar to the card Dr. Stetson has passed around. The employer is notified at once. The case is treated in the Out-Patient Department for two weeks and the number of visits noted. At the end of that time a bill is sent to the insurance company, at the rate of $5.00 for the first treatment and $1.00 each for subsequent visits. After this the patient is treated as an ordinary charity case.

If the case is admitted to the wards with, for example, a fractured thigh, a bill is sent at the end of two weeks and a second one later. The insurance companies always refuse to pay this second bill, and the case is brought before the Board, who up to now have always upheld the hospital.

The method of cleaning the wounds depends on the type, and there is no rule. A mechanic, whose hands are very dirty, has the part shaved, scrubbed with soap and water and chlorinated soda, and the wound douched out with a weak solution of iodine. Silkworm gut and horsehair are the suture materials commonly used. In small incised wounds the part is shaved, dry, the wound and skin painted with iodine, and the wound closed. Iodine and alcohol, 70%, are used extensively, but bichloride of mercury is used less and less each year.

An x-ray is taken of all fractures or suspected fractures and a second x-ray after reduction. This second x-ray I consider of more value than the first, as it enables the surgeon to be sure of good reduction. An anesthetic is always given to reduce a fracture.

We have some trouble with cases that have been treated for two weeks by unscrupulous physicians for the fee, and then sent to the hospital. It is hard to explain to these patients at times why the result of a Colles' fracture is so poor.

The insurance companies often try to get the hospital to give opinions and act as experts, but we have consistently refused. Cases that cannot be settled are at times sent to the hospital by the Board for an impartial opinion. These cases are seen by the heads of the various departments and a written report made. A fee of $5.00 is charged. I have seen several cases in this way, and with few exceptions they have been malingerers. Dr. Cotton says that malingering is not common, and is seen only in old people and foreigners, as young men are glad to get back to their work and make more money.

PAIN IN THE RIGHT LOWER QUADRANT.*

BY WILLIAM WARREN TOWNSEND, M.D.,
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ALL general and abdominal surgeons appreciate thoroughly the significance of pain in the right lower quadrant of the abdomen, and this is likewise true especially of those of us who devote special attention to surgery of the genito-urinary tract. It is not uncommon, after we have operated on patients for the relief of painful conditions in this location and have made possible to them the resumption of normal activity, to note a recurrence of the former pain, oftimes in increased severity. It is this class of cases that we wish to mention briefly, in the hope of eliciting a discussion which will call to light enough data to uphold our contention that this subject is a most important one.

Pain in the region under discussion should be considered from a two-fold viewpoint. Much of what belongs under abdominal pain proceeds from the superficial, or protective structures which are common to the entire abdomen, and include the skin, cellular tissues, muscles and parietal peritoneum. Painful conditions like erysipelas, phlegmon, neuralgias, painful neoplasms, etc.; may occur, at least in theory, in any region of the abdomen and are none of them peculiar to the right lower quadrant. The same is true of subjective or hysterical pains. Before proceeding to the practical part of our paper we may quote a little from Behan's work on pain. Hyperesthesia and hyperalgesia are of little value in localizing the source of pain. Spontaneous pain must be carefully distinguished from pressure pain, which is practically synonymous with tenderness. Pressure may cause or aggravate tenderness. The pressure excited may be superficial, ordinary or deep. While spontaneous and pressure pain tend to coincide, numerous departures are known, as in gall-stone disease in which, while tenderness is felt directly in the gall-bladder, spontaneous pain is felt at the angle of the scapula. Pressure pain is usually associated with rigidity of the subjacent muscles.

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Spontaneous pain may be subjective or objective. The former is generally termed psychogenic, which term includes hysterical neurasthenic, habit and occupation pains. Objective pain may be due to organic or functional causes. The former class is represented chiefly by inflammatory pain and various complicated conditions in which pain is felt at localities remote from the lesion, as a result of the complexity of nerve distribution and anastomosis. Pain in an affected structure may be associated with pain in a remote locality. Pain in hip joint disease is referred to the knee. After amputation stump-pain may be felt in an imaginary leg. When one kidney is diseased pain may be felt in its fellow. Concrete facts like the preceding have long been known, but when Behan and other authorities on pain attempt to form elaborate classifications which include referred, reflex, transferred, projected and other pains, the artificial character is readily apparent and much confusion arises. A given pain might belong equally to several varieties. We are little better off in this respect on them when the term "sympathetic pain" accounted for all secondary pains. Deep-seated pains in the right lower quadrant are due to a local, demonstrable pathology. A patient referred to us for recurring attacks of pain in the right lower quadrant had had an appendectomy several years previously and was afterwards operated upon for extensive adhesions in the right abdomen. This case fits well into the group described by Cumston as the intestinal group, he differentiating it from the pelvic group, which includes lesions of the tubes, ovaries and ureters. Ureter catheterization showed the patient to have a right ureter, through which it was impossible to pass any sized ureteral catheter or bougie. At operation many adhesions were found which, undoubtedly, pulled on the ureter to such an extent as to cause the kink that produced the obstruction. This case illustrates the type with a demonstrable pathology in the right lower quadrant, producing symptoms of ureter or kidney disease; and while such cases are common, I believe from our limited experience, that patients with symptoms of a surgical lesion in the right lower quadrant, in which the lesion is found in the kidney or ureter, are more common than is appreciated. One has but to study the work of Head on the subject of referred pain to be impressed with the possibility of pain in the right lower quadrant due to lesion in the kidney or ureter. We all recall Kelly's statement, that 60% of all patients who complain of right-sided pain have kidney disease, the pain coming from the capsule and subcapsular tissue. According to Head, the affected nerves come from the last three dorsal and first lumbar segments of the cord.

The most conspicuous pathological conditions of the kidney which cause pain in the right lower quadrant are the infections, and pain in

this region due to a calculous kidney we know of in but one case; in this one there was a possibility of a ureteral stone. However, the latter was never demonstrated by x-ray or cystoscopy, as the patient would not consent to these procedures.

Movable kidney in our experience produces pain in the right lower quadrant in a percentage of cases. In two cases recalled the pain was not of the referred type, but due directly to a sensitive kidney found in the locality mentioned. In acute congestive conditions of the kidney, it is possible to obtain a referred pain. In medical nephritis Behan presents cuts of tender zones. New growths of the kidney—the hyper-nephromata—may cause pain in the right lower quadrant.

Maylard, in referring to the reno-renal reflex, cites a case of left kidney disease with pain in the right lower quadrant.

Pathological conditions of the upper ureter, as a calculus lodged at the uretero-pelvic junction, will cause a referred pain in the right lower quadrant. Such a case was seen by us through the courtesy of the surgeon who had operated upon the patient for appendicitis. The appendix at operation was of the anemic type and really not diseased. The pain, complained of by the patient, recurred as soon as he was up and about again, and x-ray and ureter catheterization revealed a calculus at the point of first constriction in the ureter; we removed it and the patient was relieved of his pain. A urinary examination made of this patient's urine at the time of first operation revealed blood and a few leucocytes. As blood is found in the urine in so many appendix cases, it rather impairs the value of this aid to differential diagnosis. Pain elicited by deep pressure at the point of intersection of a horizontal line drawn from the iliac spine and one drawn perpendicularly at the pubic spine of either side, will give us approximately the point at which the ureter crosses the pelvic brim, the second point of physiological narrowing of the ureter, and a common point of arrest in the passage of renal calculus. Calculi impacted at the third point of physiological narrowing of the ureter generally produce pain low down in the right lower quadrant and groin, which radiates to the inner side of the thigh. Right-sided ureteritis may produce pain in the right lower quadrant, and it is generally provoked by deep pressure at the point where the ureter crosses the brim of the pelvis, as described above.

We cannot dismiss the subject of right-sided abdominal pain due to ureter and kidney disease, without emphasizing the importance of always being on guard for the possibility of renal tuberculosis. This has been most forcibly impressed upon us recently when we removed a large tuberculous pyo-nephrotic kidney from a patient, who had had her appendix and right ovary removed for colicky pain in the right lower quadrant.

Bladder disease does not cause pain in the right lower quadrant, except as it may extend into the right side from the suprapubic region. We have seen several cases of diverticula, which extended into the right side, and deep pressure on the tumor would cause pain. In two cases of congenital hernia with symptoms of irritable and frequent urination, there was marked pain in the right lower quadrant. At operation for hernia, the bladder was found to be adherent to the hernial sac.

In the female, urethral disease is felt in the area of the twelfth dorsal nerve, which corresponds more or less with the right lower quadrant.

In cases of disease of the urethra in the male, we do not recall any which caused pain in the right lower quadrant; nevertheless, disease of the posterior urethra, prostate, vesicles, and the structures in the prostatic urethra are so closely associated with the urethra that it is difficult to differentiate. Fuller first called our attention to vesicle colic, and we are certain that a right-sided diseased vesicle has ofttimes been mistaken for appendicitis. Young, Geraghty and Stevens, in their article on prostatitis in the 1906 Transaction of Johns Hopkins Hospital Association chart, referred pain in the right lower quadrant as being due to prostatic disease; however, most all cases of chronic prostatitis are associated with vesiculitis.

In Conclusion. It would seem that a careful interrogation of any subjective or objective symptom, pointing to disease of the genito-urinary tract, and a painstaking examination of the urine, not of one specimen, but of several, may suggest disease and a further study of these organs before operating for obscure pain in the right lower quadrant.

DISCUSSION.

DR. F. H. GERRISH, Portland, Me.: Not only does pain in the appendix region sometimes depend upon acute trouble at a considerable distance, but a bad appendix may occasion great disturbance in another organ, without displaying any symptoms directly. A case illustrating this occurs to me: A young woman had a constant irritation of the bladder. Finding no calculus or other obvious cause, I etherized her, dilated the urethra, and explored every part of the bladder; but nothing was discovered to account for her suffering. A while afterward she had a frank appendicitis, and I operated, removing an appendix that had evidently been the seat of a low-grade inflammation for a long time. After recovering from the anesthesia, she was able to retain her urine normally. The irritation of the bladder was a reflex from the chronic appendicitis.

DR. GARRY DEN. HOUGH: I would like to add—acute inflammation of a Meckel's diverticulum.

DR. ARTHUR T. JONES: There is another condition which I wish to mention; it is that of enlarged mesenteric glands, which are found rather frequently. Many of the glands are calcareous and are often tuberculous in origin. These cases are usually operated upon with the diagnosis of appendicitis. Often we find sufficient inflammatory condition to account for the enlarged glands. The ileum may be bound down into the pelvis, producing acute symptoms. One feature that is important in cases of tuberculous mesenteric glands is the low leucocyte count. With pain in the right lower quadrant, where you expect to find the appendix diseased, but in which you find it not sufficiently inflamed to account for the symptoms, investigate the mesentery for tuberculous glands and follow the ileum along for several inches, and you will often find the cause of symptoms.

DR. JOHN H. CUNNINGHAM, JR.: Dr. Townsend has called our attention to the more common condition within the genito-urinary tract which may give rise to abdominal symptoms in the interesting right lower quadrant of the abdomen. Those especially interested in abdominal surgery, and less so in genito-urinary surgery, may receive help in the differential diagnosis of obscure conditions located in this region. While it is true that there are diseases of the genito-urinary tract which give rise to the suggestion of an abdominal disease, the reverse is also true. Disease of the appendix and the pelvic organs may give rise to symptoms directing attention to the urinary tract, and give the impression that the condition is dependent upon diseases of the urinary system rather than to diseases of any abdominal organ. I have seen several cases in which such symptoms have been dependent upon an appendix adherent to the ureter, some pre-operative and some post-operative. The former have produced an infection of the urinary tract in some instances, and post-operative adhesions following appendectomy have caused urinary symptoms by involving and constricting the ureter. I have come to consider any instance of hydro-nephrosis in which an appendix operation has been performed that the obstruction to the ureter may most probably be found in the appendix region. I have had cases suffering severely with frequent and painful urination, in which the ovary has been found prolapsed into the pelvis, and adherent to, or adjacent to, the bladder, whereby even moderate distention of the bladder produced most distressing dysurea. Most of the cases have been patients upon whom pelvic operations have been performed, without fixation of the ovary. The removal of the ovary in these cases has resulted in complete relief.

DR. P. E. TRUESDALE: A young man, 28 years old, was referred to me to be operated upon for chronic appendicitis. There was little in his history or physical examination to excite one's suspicion of kidney stone. However, having adopted a routine method of radiographic examination of the kidney fossa before operating for chronic appendicitis, the search for the possible presence of stone in this case revealed as many as five in the right kidney. This print shows five calculi quite clearly. The urine showed a few cells from the kidney pelvis. The kidney was palpable, but not perceptibly enlarged, at least, to the degree that one would expect with the presence of several fair-sized stones. X-ray examination is a simple precaution in similar cases for one who is not a genito-urinary specialist, and, undoubtedly, would be a safe course for others to pursue who have special diagnostic ability in this field.

TUMORS OF THE SPINE AND CORD.*

BY WILLIAM JASON MIXTER, M.D., BOSTON.

THE group of cases here reported includes all those coming under my care in the past four years in which a diagnosis of probable tumor of the spine or cord was made, whether that diagnosis was confirmed at operation or not. Twenty-one of them were first seen at the Massachusetts General Hospital and the other five in private practice. The diverse pathological conditions met with in a series of only twenty-six shows, not only the chances for a surprise which the surgeon has when he operates on one of them, but also the chance of improvement in differential diagnosis which intensive study in the future should develop.

The examination of neurological cases has been changed a good deal in the past few years, and it may not be out of place to enumerate the routine used where tumor of the spine or cord is suspected.

This examination is similar to that used by Dr. Charles Elsberg and, in fact, is based largely on the one published by him.

A careful history should be taken, particular effort being made to bring out the following points:

Any evidence of malignant disease.
Syphilis (congenital or acquired).
Birth injury or congenital defect.
Loss of strength in the arms or legs.
Clumsiness or stiffness.
Weakness or stiffness of the back.
Pain (location and character).
Changes in sensation other than pain.
Change in sexual life.
Change in sphincteric control.
General physical examination.
Neurological examination as follows:
Examination of cranial nerves, including the examination of the fundus.
Romberg sign.
Rigidity of the spine. Presence of kyphos or scoliosis.
Tenderness of spinous processes on percussion or manipulation.
Paralysis, weakness, wasting or spasticity of any muscles or groups of muscles.
Ataxia of either arms or legs.
All superficial and deep reflexes.
Condition of the anal sphincter.
Sensory examination, to include touch, pain and thermal sense, taking care to determine accurately the upper border of disturbance and

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the presence or absence of hyperesthesia. (It is well to chart the sensory changes).

Position sense.

X-ray, usually of the whole spine, with cylinder plates of suspected areas.

Lumbar puncture with determination of pressure, freedom of flow of cerebrospinal fluid, color, cell count, presence of proteid, Wassermann and colloidal gold tests.

(Dr. J. B. Ayer has been kind enough to do the lumbar punctures on most of the recent cases).

Full clinical histories of all of this series would be uninteresting, but abstracts of most of them are given as follows:

Case 1. P. T. W. Male, 41 years. Diagnosis: Glioma of the dorsal cord.

History. Increasing weakness of the legs, and pain in the abdomen for five years, with partial loss of sphincteric control. Examination showed marked weakness and ataxia of legs, inability to walk, all tendon reflexes of the lower limbs were much increased, Ankle clonus and Babinski present on both sides. Incontinence of urine and feces. There was marked sensory change below the fifth dorsal level. A large decubitis was present. Wassermann was negative. No examination of the cerebrospinal fluid was made.

A diagnosis of probable tumor of the cord was made and laminectomy was performed, exposing the cord from the third to the sixth dorsal segment. The cord showed a fusiform swelling about 5 cm. in length, which was purplish in color and was evidently due to an intramedullary tumor.

The tumor was removed in two stages, the cord being split at the first operation, and the extruded tumor removed some weeks later. Pathological examination showed it to be a glioma. The tumor, which was 3 by 4 cm., had already caused such destruction of cord tissue that only slight improvement could be hoped for.

This patient made an uneventful recovery from the operation, but remained almost completely paralyzed. He died three months later from renal infection. There was no autopsy.

Case 2. S. H. M. Male, 50 years. Diagnosis: Glioma of the brain and cord.

History. Symptoms of four months' duration, beginning with disturbance of vision and vertigo. Later, headache and vomiting. At this time he developed severe pain in the back, groins and thighs, inability to walk and numbness of legs. All symptoms were growing rapidly worse. Positive findings as follows:

Cranial nerves:

1. Normal.
2. Vision only fair. Left homonomous hemianopsia. Moderate degree of choked disc.
3-7. Normal.
8. Hearing poor, particularly on left.
9-11. Normal.
12. Tongue protruded slightly to left.

Pupils: Right larger than left. Reaction normal. No aphasia. Memory and orientation fair. Indefinite history of uncinate gyrus attacks. No asteriognosis. Romberg is questionable on account of weakness. There has been ataxia of the legs in the past, but they are now almost completely paralyzed. There is marked disturbance of sensation on the legs and trunk, which cannot be mapped out on account of the patient's stupidity. Sphincters are not disturbed. All reflexes are markedly diminished. Muscle sense is absent in the legs. Normal plantar reflex present.

The spinal fluid was, under increased pressure, clear, pale greenish yellow color, 15 cells per cu. mm. Noguchi and alcohol tests positive. Colloidal gold test positive for tumor or tuberculosis. Wassermann negative. X-rays all negative.

In view of the increased intracranial tension, a decompression was done, and the symptoms directly referable to the cord were neglected. The brain was found under considerable tension and no tumor was made out. The patient died on the eighth day, without any change in symptoms, from pneumonia.

Post-mortem examination showed a glioma of the right cerebral hemisphere with extension into the cerebellum and down the membranes of the cord to the cauda equina.

Case 3. A. M. M. Female, 36 years. Diagnosis: solitary tubercle of the spinal cord.

History. Two years before her entrance to the hospital the patient was exposed to tuberculosis for six months while caring for her sister, who died of the disease. This was followed by a severe attack of "bronchitis" and pleurisy, at which time her chest was aspirated and much fluid withdrawn. Six months ago she began having severe pain in the groins and legs, which has been growing steadily worse, and during the past few weeks has been associated with a rapidly increasing spastic paralysis of the right leg. There has been no sphincteric disturbance.

Positive findings on examination were as follows: The lungs suggested latent tuberculosis. Normal mobility of the spine was present. There was no kyphos or tenderness. The right leg showed a complete spastic paralysis, while the left was normal. All reflexes were markedly increased on the right and a right Babinski was present. Below the tenth dorsal level there was considerable sensory disturbance, but nowhere was sensation absolutely lost. There was no band of hyperesthesia.

The cerebrospinal fluid was colorless but slightly cloudy, and showed many lymphocytes on microscopical examination. Wassermann and x-ray examinations were negative.

A tentative diagnosis of tuberculosis was made, but in view of the fixed upper level of cord disturbance and the severity of her symptoms, exploration was deemed advisable.

At operation the cord was exposed from the ninth dorsal segment down, and nothing of moment found. The canal was not explored upward. The wound healed without incident, but she grew steadily worse, becoming completely paralyzed and incontinent, and finally developed a very large decubitis. During this time there was no apparent change in the upper level of sensory disturbance. She died nine weeks after the operation.

At autopsy a solitary tubercle 1 cm. in diameter and practically replacing the whole centre of the cord, was found 3 cm. above the upper end of the incision in the dura.

Case 4. E. D. W. Male, 50 years. Diagnosis: Cyst of cervical cord.

History. Seven years before his entrance to the

hospital the patient began having shooting pain at times in the left arm, with some stiffness in the neck and shoulder. Three years later the pain was replaced by numbness, and about two years later he began to notice stiffness in the left leg and unsteadiness in walking. More recently both legs and arms have become involved and he has had retention of urine and constipation at times.

Positive findings as follows: There was weakness and atrophy of left forearm. Reflexes were absent on the left and increased on the right. There was general weakness of both legs. The knee jerks were increased, the right more so than the left. Babinski, Gordon and Oppenheim reflexes present on both sides. Sensation (touch, pain, heat and cold) was diminished below clavicles and lost below the fourth rib. The cerebrospinal fluid was of a clear, yellow color. Gold test positive for tumor or tubercular meningitis. Wassermann negative. Pressure normal. Six mononuclear cells per cu. mm.

At operation the cord was exposed from the fourth to seventh cervical segments. It was much swollen and hard, and on splitting the cord a cyst was found filled with yellow fluid, which measured about 3 x 1 cm.

Following operation there was no change for a time and then his symptoms gradually increased, with complete paralysis of legs and arms, and loss of sphincteric control. One year later he had improved enough to use his hands, but more recently this power has been lost again. He has reported only by letter since leaving the hospital three years ago, as he lives a very long distance from Boston.

CASE 5. P. E. V. Male, 19 years. Diagnosis: cholesteatoma of cervical cord.

History. Six years ago the patient had some pain in back off and on for three months. One year later he began having pain and weakness in right leg, causing him to drag it in walking. Eighteen months ago, after a fall, he developed numbness and weakness in shoulders. For past ten months both legs have grown stiff and clumsy and he has had to use crutches. Loss of control of bladder and rectum a few times. Now he cannot walk at all, and has considerable pain in the back and legs.

Positive findings as follows: The left pupil was greater than right. His arms were of normal strength, except for definite ulnar weakness on left. The arm reflexes were active on the right and absent on the left.

Abdominal reflexes were present only in lower quadrants.

Cremasteric reflexes absent.

The knee jerks and ankle jerks were much increased. Patellar and ankle clonus, double Babinski and Oppenheim being present. His legs were both spastic, almost immovable and held crossed.

The seventh cervical and upper dorsal spines were very prominent, and there was some stiffness of the spine.

Sensory examination showed marked diminution of touch sense on the trunk, legs and left arm, and diminution of pain and temperature sense on the left half of body and the left arm.

The cerebrospinal fluid was clear and colorless. Pressure, 140. Alcohol test positive for proteid. Other tests negative.

The x-ray examination was reported normal. Examination of the plates after operation showed a marked thinning of laminae from third cervical to second dorsal vertebra.

Laminectomy revealed a fusiform swelling of the cord and marked thinning of the laminae from the third cervical to second dorsal. Incision of this mass showed it to be a cyst filled with cholesterin and hair, the sac being about 2 x 2 x 10 cm., with the cord spread out on its ventral surface. The posterior portion of the sac was cut away and its contents removed. The dura was not sutured.

His convalescence was uncomplicated, and up to the present time his neurological condition has gradually improved. At the present time, nearly a year after his operation, he can walk quite well with a cane, but tires easily if he goes more than a mile. There is definite ulnar weakness present in the left hand and moderate spasticity in the right. His reflexes are everywhere increased and there is a double Babinski.

The changes in sensation are similar to those present before operation but much less marked.

CASE 6. C. J. M. Male, 40 years. Diagnosis: varix of lumbar cord.

History. Pain in legs and spine beginning five years ago. There has been some constant pain and also acute attacks, in which the pain is very severe. One and one-half years ago he began having difficulty in starting urine, and one year ago great difficulty with his bowels. These symptoms have persisted. He has had many forms of treatment, including orthopedic appliances and osteopathic manipulation.

Positive neurological findings.

Knee jerks were increased, the left being greater than the right.

Ankle jerks not obtained.

Plantar reflexes equal and normal.

No clonus, Oppenheim or Gordon reflexes present.

There was moderate atrophy and weakness of all the muscles of the right leg, and right toe drop. Marked tremor of legs present. Joint and muscle sense unimpaired.

Rectal sphincter flaccid. No sensory changes. X-rays negative.

Cerebrospinal fluid clear, deep yellow color. Pressure not increased. Four cells per 4 cu. mm.

Proteid tests all strongly positive.

Colloidal gold positive for tumor or tuberculosis.

Wassermann negative.

Although the signs were confused and the absence of sensory change surprising, a tentative diagnosis of tumor of the cauda equina or conus was made and operation advised.

Laminectomy, with exposure of the lumbar cord and cauda equina, showed a marked varicosity of the dorsal veins over the cauda equina and sacral cord. No tumor was seen in this vicinity and none felt by a catheter passed up and down in the spinal canal. Nothing was done to these veins, and the wound was closed as usual.

Convalescence was uneventful. There was gradual, steady improvement, beginning while in the hospital, and which lasted for six months. At that time there was recurrence of all symptoms. He was readmitted to the hospital for further study. Examination revealed the signs as before operation. X-rays, etc., negative. No further operation advised as yet.

Case 7. O. J. D. Male, 46 years. Diagnosis: fibro-sarcoma of dura.

History. Ten months before entrance to hospital his legs gave way and he fell to the ground. A few days later he began to have a feeling of numbness in both hips. There was no paralysis at this time. Three months later pain and tingling began in both legs, and two months after this the legs began to grow weak. Has been getting steadily worse, and he is now bedridden and incontinent of urine and feces.

Positive neurological findings as follows:

There was marked atrophy of both legs and paralysis of sphincters. All the muscles of left leg were paralyzed and reflexes diminished or absent. Right very weak. Reflexes everywhere increased.

Sensation was diminished to touch, pain and temperature up to the iliac crests and in a saddle back area over sacrum. Lumbar puncture was not done. Blood Wassermann negative. X-rays negative.

Notwithstanding the fact that the patient dated all his trouble from the fall, and thought that he had injured his spine at that time, a probable diagnosis of tumor was made and laminectomy advised.

At operation a dural tumor 2.5 x 3 cm. was found at the level of the first lumbar vertebra, to the right of the cauda equina. This was completely removed, together with a narrow margin of dura about it. Pathological report, fibro-sarcoma.

Motor and sensory functions have steadily increased, and the patient reports by letter four years after operation that his greatest difficulty is partial loss of bladder control and weakness of the legs, but that he is still improving and expects to be well before long.

Case 8. N. T. L. Female, 42 years. Diagnosis, fibro-sarcoma of dura.

History. Two years before admission to hospital the patient noticed that her feet were "clumsy." About this time she had pain in the back for one night, which was severe enough to keep her awake, and has had no pain since. The clumsiness and stumbling gradually increased, and she found she could not distinguish hot or cold or feel pin prick. This gradually extended from the feet up the legs to her waist. Later she had urgency of defecation and urination, but no incontinence. These symptoms have all grown steadily worse and she can walk only a little.

Neurological findings as follows: Knee jerks were increased, right being greater than the left. Ankle jerks increased, clonus on right. Babinski on right. Normal plantar on left. No Gordon or Oppenheim. Sphincters normal. Distinct loss of muscular power.

Sensation: Loss of position sense. Almost complete loss of pain and thermal sense below sixth dorsal. Loss of pain sense seems to extend up to fourth dorsal. Touch not markedly impaired.

Cerebrospinal fluid: Pressure, 210.5 cells per cu. mm. Clear and colorless. Proteid tests positive. Colloidal gold positive for syphilis or non-tubercular inflammatory process. Wassermann negative.

This patient was thought to have multiple sclerosis for the first 18 months of her illness, but as time passed, and the upper level of sensory disturbance became more marked, this diagnosis was abandoned, and a probable diagnosis of tumor of the cord was made.

At operation the dura was exposed from the level of the third dorsal segment to that of the sixth, revealing a rounded, irregular tumor 3 cm. across, arising from the dural sheath of a posterior nerve root at the fourth dorsal level on the right. This was completely removed, together with the nerve root and adjacent dura. The dura was closed with fine silk. Pathological report: fibro-sarcoma.

She made an uneventful convalescence and at the present time (two years after operation) her neurological examination is absolutely negative; the spine is flexible, and she has been working as a laundress for the past six months.

Case 9. J. K. Male, 53 years. Diagnosis: neurofibroma of posterior root.

History. Pain in right thigh and knee for 17 years, associated with disturbance of thermal sense and weakness of muscles of lower leg. Two years before his entrance to the hospital a careful neurological examination showed disturbance of sensation to both legs and in a saddleback area over sacrum, touch, pain and temperature all being involved; also marked weakness of the right glutei and paralysis of all muscles of the right leg below the knee. More recently he has had some weakness of the left leg.

Positive neurological findings as follows: The right leg is somewhat smaller than left. There is considerable weakness of muscles of both legs, including glutei and paralysis below the knees, except for slight movement of the toes of the left foot. Knee jerks: right absent; left increased. Ankle jerks absent. Plantar reflexes absent.

Sensation: There is a saddleback area of partial anesthesia about anus (touch, pain and temperature). Same on outer sides of both thighs. The feet are almost completely anesthetic.

X-rays negative. Spinal fluid clear, colorless; not under pressure, 40 cells per cu. mm.

All proteid tests positive. Colloidal gold test positive for tumor or tuberculosis.

A diagnosis of tumor of the lower part of the cauda equina was made and exploration advised.

Laminectomy was performed exposing the lower two-thirds of the cauda equina and nothing abnormal found. There was resistance to the passage of catheter 4 cm. above this level. On account of patient's condition, further exploration was deferred until some weeks later. At this time a cylindrical tumor 3 x 1 cm. was removed, arising from a posterior nerve root, which on pathological examination proved to be a neuro-fibroma.

At this time (one year later) motor function has partly returned, although he still has toe-drop. He can walk with a cane and has almost no pain. Sensation has almost entirely returned.

Case 10. S. D. K. Female, 20 years. Diagnosis: tuberculosis of spine.

History. Pain between shoulders for six months, with slight kyphos in upper dorsal region. For two months she has had weakness and numbness of the feet and legs. All these symptoms increasing steadily.

Examination showed a slight kyphos in the region of the first and second dorsal vertebrae. There was no tenderness of the spine and no spasm of the muscles of the back.

Abdominal reflexes were absent.

Knee jerks were increased, the right being greater than the left. There was double ankle clonus, Babinski and Oppenheim. Temperature sense

everywhere undisturbed. Tactile sense was lost below second dorsal and pain sense below eighth dorsal. There was no area of hyperesthesia.

X-ray shows a difference in articulation of lower cervical vertebrae on the two sides.

Spinal fluid shows no increase in pressure, 13 cells per cu. mm.

Proteid tests positive. Colloidal gold positive for tubercular meningitis or tumor. Wassermann negative. Von Pirquet skin reaction positive.

A probable diagnosis of tumor of the seventh cervical or first dorsal vertebra was made and laminectomy advised.

At operation the cord was inspected and found normal. The dura was then closed with silk and a mass in front of the dura opposite the sixth cervical vertebra was investigated. A tubercular abscess was opened and about 50 cc. of pus evacuated. She made a slow recovery, and now, at the end of two years, is in excellent general condition and has no pain.

Examination shows marked rigidity of the neck and slight weakness of legs. Her reflexes are somewhat increased. There are no sensory changes. She is doing her own work and has had a child since the operation.

CASE 11. M. A. Male, 22 years. Diagnosis, tuberculosis of spine.

History. Sudden sharp pain in lumbar region, radiating down the legs six months before entrance to hospital This pain has increased gradually in severity and for six months he has been unable to walk, partly from weakness and partly on account of pain.

Positive findings were as follows: The lumbar spine is somewhat stiff, particularly in rotation, which causes pain referred to the legs. There is marked atrophy of both legs, with complete motor paralysis. Knee and ankle jerks absent. No plantar response. No clonus. Sphincters normal. Pain sense diminished or lost below third lumbar. Touch and thermal sense not disturbed.

X-ray shows a destructive process of third lumbar vertebra. Cerebrospinal fluid was yellowish in color and coagulated in a few moments. Proteid tests positive.

It was impossible in this case to make a positive diagnosis. Both tumor and tuberculosis were considered and the x-ray examination was more suggestive of tumor than of tuberculosis.

At operation a large tubercular abscess was opened to the left of the vertebral column without doing a laminectomy, and much pus was evacuated. The involvement of the vertebral bodies could be plainly felt. The abscess cavity was wiped out and the wound closed without drainage.

Following operation there was immediate relief of pain, and within a few days gradual restoration of motor function. He has been in a plaster jacket ever since operation and now, at end of four months, can move both legs normally, although he has not been allowed to walk.

CASE 12. A. M. C. Female, 54 years. Diagnosis: myeloma of spine.

History. Pain in the lumbar spine for the past two years. There has been numbness and weakness ot both legs for the past ten weeks. The numbness was first noticed as a small spot on the outside of right thigh, and since has gradually spread to both legs. There has been difficulty in starting the urine for two months.

Positive neurological findings: Knee jerks were increased. Ankle jerks not obtained. Positive Babinski, Gordon and Oppenheim. Partial loss of sensation (touch, pain and temperature) across lower abdomen, upper right thigh and below right knee.

Muscles of both legs were weak, and position sense was faulty. The sixth and seventh dorsal vertebrae were quite tender on pressure. Slight kyphos present. The urine showed a very slight trace of albumen. Spinal fluid was colorless, and the Wassermann, alcohol and colloidal gold tests were all negative.

X-ray shows a destructive process of sixth dorsal vertebra.

A diagnosis of malignant disease of the sixth dorsal vertebra was made and operation advised, although it was felt that little could be done.

At operation a soft, gray infiltrating tumor was found arising from the vertebral body or the intervertebral disc compressing the cord. A portion of the tumor was removed and foul laminae removed for decompression.

Pathological report, myeloma.

Bruce-Jones bodies were later found in the urine.

About two weeks after operation the patient became suddenly almost entirely paralyzed below waist, apparently from slipping of the already weakened vertebrae. The subsequent history has been progressive increase of symptoms and general weakness, and x-rays show involvement of the vertebrae from sixth to ninth dorsal inclusive.

CASE 13. J. D. F. Male, 43 years. Diagnosis: spindle cell sarcoma of lumbar spine.

History. Gradually increasing pain in the lumbar spine for one year. For four months he has had progressive pain and weakness of the left leg, beginning in the thigh. At times there is a feeling of numbness. There is no loss of sphincteric control. There has been considerable loss of weight.

Positive findings as follows: The lower spine was rigid and showed a moderate scoliosis to the left. There was some atrophy and weakness of muscles of the left thigh. Right thigh and lower legs were not remarkable. No sensory changes could be made out. The plantar reflex was absent on left. Knee jerk diminished on left. The cerebrospinal fluid was clear and colorless and the Wassermann was negative.

X-ray negative.

A probable diagnosis of tumor of the cauda equina was made, although the absence of sensory disturbance was against.

At operation a malignant process was disclosed involving the right lateral processes and the laminae of the second and third lumbar vertebrae. Part of the tumor was excised and the laminae removed to relieve pressure. The dura was not opened. Pathological report, spindle cell sarcoma.

There was relief of pain for two weeks only, followed by rapid increase of symptoms and death in four months, notwithstanding the use of Coley toxines.

There was no autopsy.

CASE 14. C. C. Female, 55 years. Diagnosis: round-cell sarcoma of lumbar spine.

History. Intense pain in the lower spine and

hips, beginning rather suddenly one year ago. Her left side alone was affected until three months ago. There was no weakness of legs, no loss of control, and no sensory disturbance. The pain is increased on motion.

Positive findings as follows: There was a very slight, low lumbar kyphos, with distinct tenderness from the third to fifth lumbar vertebrae. No disturbance of sensation could be made out. The deep reflexes of the legs were all increased equally. No Babinski present. There is a suggestion of left ankle clonus. Blood Wassermann, negative. All attempts at lumbar puncture gave a little bloody fluid.

X-ray shows a destructive process in fifth lumbar vertebra.

A diagnosis of malignant disease of the lumbar spine was made, and a very bad prognosis given. On account of the intense pain operation was offered as a last resort.

Operation revealed a malignant process involving the laminae of all the lower dorsal spines. On removal of some of the new growth for diagnostic purposes the dura was exposed, as the laminae in places were completely replaced by new growth. Nothing further was attempted on account of the extent of the process. The patient failed rapidly and died in a few hours.

Pathological report: round-cell sarcoma. No autopsy was allowed.

Case 15. C. J. H., male, 50 years. Diagnosis: metastatic hypernephroma of spine.

History. Six months before admission to the hospital the patient fell, injuring his lumbar spine. This was followed by pain in back and thighs and a rigid spine. Three days before admission there was sudden, complete paralysis below the mid dorsal region. He has had considerable pain ever since.

Positive findings as follows: There is complete flaccid paralysis below sixth dorsal segment. Reflexes absent and complete loss of sensation below this level. Zone of increased sensibility 3 cm. in width was demonstrated at level of fifth dorsal segment. Wassermann negative. There was a hard tumor of third rib just in front of anterior axillary line. X-ray showed an extensive destructive process of fourth dorsal vertebra.

A diagnosis of malignant disease of the spine was made and operation offered only as a last resort, as in the preceding case.

At operation an irregular, non-encapsulated tumor was found involving the body of the vertebra and the intervertebral discs. The tumor caused marked compression of the cord, although the dura was not invaded by it. Most of the tumor was removed and found on pathological examination to be a metastatic hypernephroma.

The patient was not relieved by the operation and died a few weeks later. No autopsy was allowed.

Case 16. A. F. Female, 53 years. Diagnosis, metastatic leio-myoma of spine.

History. Fifteen months before entrance to the hospital she was operated on for a large fibroid tumor of the uterus. This was examined pathologically and nothing malignant noted. Eight months later she had a small tumor removed from the skin of the back in the vicinity of the left sacro-iliac joint. Six weeks ago she began having severe pain in the back between the shoulder blades. Three weeks later her pain had radiated downward into the legs, which began to be weak and unsteady. For the last week she has not been able to walk, the pain continues with great severity, and there is some twitching in the right leg. She is incontinent of urine and feces.

Important points on examinations were as follows: The abdomen was full, soft and tympanitic; no masses could be made out, and the scar of her operation was not remarkable. Vaginal examination revealed the cervical stump, but was otherwise not remarkable. The spine was rather rigid from the fourth to the tenth dorsal vertebrae, showed a moderate kyphos, and there was a sense of fullness to the right of the spine at this level. There were two small nodules in the subcutaneous tissue of the back.

Both legs were very weak throughout. Knee jerks were markedly increased. There was double ankle clonus and Babinski.

Sensation was everywhere diminished below the level of the fourth rib, where there was a zone of hyperesthesia 2 cm. in width.

X-ray examination was unsatisfactory and lumbar puncture not done.

The small tumor on the back was removed and found to be leio-myoma, probably malignant. In view of the severe pain, laminectomy was decided upon and the laminae removed from the seventh cervical to the third dorsal. Outside the dura was a malignant tumor extending across in front of the cord and compressing it markedly. The new growth seen was removed, together with part of the bodies of the first and second dorsal vertebrae. The dura was unopened. Pathological report: metastatic malignant leio-myoma.

This patient had relief from pain for nearly a year, and almost complete relief of paralysis for eight months, and finally died of general internal metastases. The diagnosis was confirmed at autopsy.

Cases 17-22. Cases 17-22 were all cases of carcinoma of the spine following amputation of breast for carcinoma. None of them were operated on and all of them have since died.

Case 23. B. F. Female, 53 years. Diagnosis: metastatic carcinoma of spine.

History. Breast amputation five years ago for carcinoma. Two months ago she began having dull pain in both shoulders. Three weeks later suddenly she became partly paralyzed from the waist down. This has cleared up a little, but the pain has increased and is now very severe. There is no loss of sphincteric control.

Positive findings were as follows: Scar of radical removal of breast. It was well healed and there was no evidence of recurrence. The upper dorsal and lower cervical spine was rather rigid, but there was no tenderness or kyphos. Diminution of pain and touch demonstrated to the level of the third rib. There was no demonstrable change in thermal sense.

Abdominal reflexes were normal. Knee jerks active. Achilles jerks active. No ankle clonus. Double Babinski present. There was marked general weakness of muscles of legs. X-ray suggests a destructive process in second dorsal vertebra. Lumbar puncture gave clear fluid under normal pressure. Wassermann negative. Proteid reaction not done.

It was felt that this might possibly be a new growth

arising from the dura, and not metatstatic from the breast on account of the length of time which has elapsed since her operation, and exploratory laminectomy was advised.

At operation metastatic malignant disease was found, involving the laminae and bodies of the fifth and sixth cervical vertebrae and compressing the cord. This was partly removed and a rather wide laminectomy done. The dura was not opened.

X-ray treatment was instituted while she was in the hospital following operation. Considerable relief of pain, and her legs were much stronger when she was discharged.

CASE 24. A. B. S. Male, 50 years. Diagnosis deferred.

History. Five months before entrance to the hospital he began having sharp pain in back, buttocks and thighs, which was increased on motion and varied in severity. This was followed two weeks ago by severe pain associated with loss of control of bladder and rectum, and inability to walk. He has had no girdle sensation.

Positive findings on examination were as follows: There was no atrophy of legs, which, however, were ataxic. Knee jerks were markedly increased, but equal, and there was patellar clonus on the left. Plantar reflexes were normal, and there was no Oppenheim or Gordon. Kernig's sign was present, also marked Romberg. There was no disturbance of sensation except questionable hyperesthesia of both feet. Cerebrospinal fluid and x-ray negative.

Operation was advised in this case, although the diagnosis of tumor seemed hardly as probable as that of multiple sclerosis.

At operation the laminae were removed from the tenth dorsal to the third lumbar vertebrae, inclusive. The cauda equina was exposed, explored and seemed normal. There seemed to be some increase in the amount of cerebrospinal fluid present. The canal was not explored upward.

Following operation his condition improved markedly. Within six weeks he could walk with assistance; had very little pain and had partial sphincteric control. This improvement has been gradual but steady, and at the present time (3 years later) he walks without difficulty and is attending to his business as station agent. He has not been seen, as he lives a long way from Boston. His only complaints are partial retention of urine and that he tires easily.

CASE 25. G. T. L. Male, 33 years. Diagnosis deferred.

History. Six months before entrance he began having a sensation of numbness and pricking in right foot. (Foot seemed "asleep.") This gradually spread upward and involved the other leg. At present it reaches to the nipple line. This whole area feels dead. He walks with difficulty and does not know where his feet are going. Involuntary urination and defecation have occurred a few times during the past month. There is a sensation as of a band about his chest.

Positive findings on examination: There is slight spasm of legs; most marked on the right. Biceps and triceps jerks are lively, also knee and ankle jerks. There is ankle and patellar clonus. Double Babinski present. His gait is unsteady and Romberg's sign is positive. There is no astereognosis or ataxia of hands, but there is distinct loss of muscle sense in legs. Sensation is almost completely lost to touch, pain, heat and cold below fourth dorsal level, where there is a narrow zone of hyperesthesia. Cerebrospinal fluid pressure 100. No cells present. Proteid tests negative. Gold chloride suspicious of syphilis. Wassermann negative.

Notwithstanding the fact that the proteid tests were negative, a diagnosis of cord tumor was made, and operation advised.

Laminectomy was performed, with exposure of the cord from the fifth cervical to the third dorsal segments. The cord seemed normal in every way, except that it was a little smaller and whiter than usual. A catheter passed up and down inside the dura met no obstruction. Nothing could be seen in front of cord or on the nerve roots.

His convalescence surgically was uneventful, but his neurological condition gradually grew worse while in the hospital; he became incontinent, developed partial paralysis of right arm and hand, and finally went home far worse than when he was first seen.

CASE 26. H. C. Female, 35 years. Diagnosis deferred.

History. Three months before entrance to hospital she began to lose control of her legs, and her whole body seemed to grow numb. A little pain in the back has been present since the beginning of the trouble. No loss of sphincter control.

Positive findings were as follows: There is general muscular atrophy of legs and trunk, also present to a lesser degree in the hands and arms. The spine is normal. There is anesthesia to the umbilicus. Partial loss of sensation from there to about the second dorsal level. There is no definite upper limit. The biceps and triceps jerks are somewhat increased, and the knee and ankle jerks are markedly increased. There is double clonus, Babinski and Oppenheim. Cerebrospinal fluid is normal. X-rays and Wassermann negative.

The diagnosis in this case was thought to be between tumor of uncertain level and multiple sclerosis, and operation was advised owing to the rapid progress and fatal outcome unless the condition could be relieved.

Laminectomy was performed twice on this patient, and the cord explored from the ninth dorsal to third cervical segment. The cord was small, hard and hyperemic, and between the arachnoid and the pia, particularly in the cervical region, were many dense adhesions. There was no improvement following operation, and the patient is gradually getting weaker.

An enumeration of the pathological conditions found at operation or autopsy is as follows:

Glioma	2
Cyst of the cord	2
Varix	1
Nerve root tumors	2
Dural tumors	1
Malignant tumors of the spine	3
Metastatic malignant growths	9
Tuberculosis of the cord	1
Tuberculosis of the spine	2
No pathological process found	3

(It is probable that at least two of these, if they come to autopsy, will prove to be multiple sclerosis.)

Operations were performed as follows, several patients being operated on twice:

Laminectomy	20
Operative deaths	0
Exploration of spine without laminectomy	2
Deaths (operative shock)	1
Craniotomy	1
Deaths (pneumonia)	1

The symptomatology of tumors of the spine and cord, and their differential diagnosis I will not take up in detail. There are several points of importance, however, which are well worth remembering. Pain is usually supposed to be one of the cardinal symptoms, yet it is frequently absent. One of my cases (No. 8) had a little pain one night three years before operation, and at no time since, and in at least three other cases the pain has been very slight. All the cases with malignant metastases, however, had severe pain.

An important positive sign, if present, is pain on pressure on the spinous processes. It is of great assistance in determining the level of the lesion. Present in five cases of this series.

Another important sign is a fixed upper level of cord disturbance. If this is present it should be taken as a distinct indication for laminectomy. If the motor and sensory disturbances below are gradually increasing, and the upper limit remains fixed a presumptive diagnosis of tumor is justifiable.

One of the first sensory changes may be a loss of thermal sense, and for this reason it is an important, though often neglected point.

The examination of the spinal fluid is of great importance, particularly the various reactions for proteids, and should always be done. Spinal fluid Wassermann is of great value in ruling out syphilis, and the blood Wassermann should not be taken as conclusive. X-ray is of great assistance, but if negative should be disregarded, as intradural growths will usually give little or no change, while those bone lesions which give positive findings are usually malignant.

Technic: In the first place the lesion should be localized as closely as possible. Then compare the position of the segments with the dorsal spine, locate the approximate level of the lesion and mark it on the patient's back before cutting down.

In dissecting away the muscles from the spines and laminae, keep as close to the bone as possible, and at first neglect the bleeding, which will probably be rather sharp. After the muscles are well stripped back to the outer ends of the laminae on one side, pack with gauze wrung out in very hot salt solution (120° Fahrenheit) and turn back the other side in the same way. Take plenty of room, and if necessary cut away some of the tendinous attachments below. Then remove the spinous processes with heavy cutting forceps, taking one above and one below the probable extent of the laminectomy. I usually take off the laminae on both sides, as the field of operation is very limited in a unilateral laminectomy.

The removal of the laminae is a very important step in the operation, as carelessness on the part of the operator may cause great and irreparable damage to the cord. My own personal choice is to remove the bone bit by bit with a pair of heavy rongeurs, taking great care to obtain the fullest lateral exposure possible and, at the same time, leaving no projecting bits of bone to tear the dura when it is opened and drawn back. This method is not the fastest by any means, but with proper care should insure against damage to the cord when it is pressed back against the bone by a neoplasm lying within or in front of it. It is important to pull up on the rongeurs as each bite is taken, that the heel of the instrument may not be depressed as the blades come together and so bruise the cord. Other methods which are of value are the use of the Hudson and DeVilbie instruments, the large-sized Horsley forceps held at right angles to the laminae, or some one of the many forms of saw.

Remove as many laminae as you think will be necessary and control all bleeding with bone wax and muscle plugs, and then dissect the epidural fat away and inspect the dura. Draw the cord in its covering of dura gently to one side and inspect the vertebrae as far as possible, and then repeat on the other side. If a new growth can be seen or felt through the dura, open a little above or below, and then enlarge the incision as necessary, taking great care not to cut any of the veins that often lie thickly over the cord. The arachnoid is not adherent to the dura, and it is often possible to open the dura for several centimeters, leaving the bulging arachnoid intact.

This is an advantage, as the cerebrospinal fluid does not run out and, becoming mixed with the blood in the wound, obscure the first inspection of the cord. If, on examination, the cord shows nothing, open the arachnoid and palpate the cord very gently. A small soft catheter or sound should then be passed gently up and down along the cord to search for an obstruction, which may be investigated at this time, or if the condition of the patient does not warrant it, at some later day. The anterior aspect of the cord and the dura is then explored by drawing the cord gently first to one side and then the other. It is best to do this by catching the posterior nerve roots or dentate ligament, on fine hooks, and the procedure is often facilitated by cutting a few slips of ligament.

If x-ray shows definite destruction of the vertebrae, care should be taken to remove few laminae, and it is possible that unilateral laminectomy is indicated under these circumstances. It is important to remember that by an extensive muscular dissection, coupled with removal of the

lateral processes, it is possible to explore the vertebral bodies in the cervical and lumbar regions to a certain extent, and in the event of an extensive malignant process, stop the operation without taking away the remaining supports from an already weakened spine. This procedure was carried out in Case 11 as a result of the experience I had with Case 12, in which there was recurrence of symptoms from slipping of the diseased vertebrae.

On exposing a tumor which is dural or extradural in origin, it is of prime importance to determine, if possible, whether it is benign or malignant. Practically all tumors outside the dura belong in this latter class, and any attempt at complete extirpation is almost certain to result in failure. However, it may be possible to remove enough of the tumor so that, coupled with the decompressive action of the laminectomy, the patient will have relief from pain and other very distressing symptoms, such as incontinence, for a considerable period of time, dependent on the rapidity of recurrence. This was clearly shown in the case of No. 16. Tumors arising from the dura or nerve roots are by far the most satisfactory to the surgeon, as they are usually benign and can generally be completely excised. Dorsal nerve roots, if involved, should always be sacrificed, if by so doing the tumor can be completely excised, but motor roots should be sacrificed only if relatively unimportant. A dural defect is of little moment as compared to the complete removal of a benign tumor.

Intramedullary growths need special attention. They may usually be recognized by fusiform swelling of the cord, either general or on one side. If such a swelling is present the cord should be split longitudinally in the posterior column, care being taken not to injure the surface blood vessels. Should it be necessary to cut such a vessel, it may be picked up and tied with fine silk. The incision may be from 2-5 cm. in length, should be carried well into the cord, and should be made with a very thin-bladed knife. Frazier's knife is excellent, but if not at hand, a Gillette razor blade answers quite well. If a tumor is encountered, the incision should be carried from the upper to the lower pole, and no attempt should be made to dissect it out. If not infiltrating, it will immediately begin to extrude. Do not pull it or do anything more than take a small fragment for pathological examination, and close up the wound with the expectation of doing a second stage two or three weeks later. At that time the tumor will often be found so completely extruded that it can be removed with little or no damage to the cord. This procedure was carried out in Case 1. In Case 5 the dura was left open and the edges of the sac sutured to the muscles in order to facilitate extrusion in case a secondary operation becomes necessary. As a rule, the dura should be tightly closed with fine silk and the muscles, fasciae and skin closed without drainage. I do not feel that plaster is necessary for a laminectomy below the second dorsal unless more than 4-5 laminae have been removed or unless the bodies of the vertebrae are involved. Plaster is indicated in high laminectomies.

In closing, I wish to summarize briefly the indications for and against operation as I see them. What are we to go on? In the first place, is the growth malignant or not. If malignant, surgery is, doubtless, ill-advised except in the presence of very severe pain, or in the hope of using radium or x-ray after a partial removal. The x-ray is probably the best single factor in determining this, but even in the presence of considerable destruction an exploration is usually deemed advisable. Very severe pain I think may be an indication for operation, even in malignant cases, as it gives a great deal of relief, even if only temporarily, as shown in Cases 13, 16 and 23. In case the x-ray is negative and symptoms of increasing pressure are present, exploratory laminectomy is always justifiable unless the patient's condition is very poor, and this should not be allowed to weigh too strongly, as the mortality of this operation is surprisingly low.

I wish to take this opportunity to express to the Neurological and Medical Staff of the Massachusetts General Hospital my deep appreciation of their interest and kindness in regard to this work; also to the Surgical Staff for permitting me to see and handle this interesting group of cases.

DISCUSSION.

DR. HARVEY CUSHING: This is a large subject, and Dr. Mixter has well covered the field and touched upon many points which might be elaborated upon. I do fewer laminectomies than I used to do. It is my feeling that a patient who has a metastatic tumor of the spine, following cancer of the breast, should not be subjected to laminectomy. There of course may be exceptions, and once or twice, in cases of extreme pain, I have divided the cord. As you know, a transverse lesion is a painless one, and the patient may live for years without actual discomforts, but it is a sorry life. For example, I have been more or less in touch with a young naval officer who was thrown from his horse eight years ago and sustained a total transverse lesion about the lower seventh cervical segment. He is free from pain, and in excellent physical condition, but his arms and legs are absolutely useless. He has been well taken care of.

Dr. Mixter's mortality is low, and I do not recall a fatality in my own series of laminectomies. But, nevertheless, it is a difficult and arduous operation. The after-treatment demands detailed attention, particularly as there may be sphincteric difficulties. It is not so easy as it is to operate upon the other side of the body.

Dr. Mixter has emphasized the fact that the meningeal endotheliomata are the most favorable lesions from a surgical standpoint. They are, as a rule, easily diagnosed. We make mistakes, of course,

but when they are found and localized there is no more satisfactory operation in surgery. When you can remove a growth cleanly and relieve pain and save people from a life of paralysis and suffering, it is an enormous consolation. I think that Dr. Mixter erred when he said that the pia protrudes after opening the dura; he surely means the arachnoid. There is one thing about these tumors that is very interesting. A little tumor of this kind is set in the spinal canal, and the cord is crowded away by the tumor. Over the growth lies one of the nerve roots, and the tumor arises, I believe, from the membranes at the point of exit of the nerve. In removing these tumors, the nerve root must be divided and the dural attachment removed, together with the growth, for otherwise there may be a recurrence of the growth.

My first experience was many years ago, in 1898; a localized and characteristic tumor. During the enucleation of this tumor I did not go quite high enough up; the tumor broke off at the upper pole. I then removed the upper fragment as a separate piece and the tumor was apparently intact. This man made a perfect recovery, and a year later I reported it as one of the six successful recorded perfect results. There were no post-operative complications and complete restoration of function. Though it was supposed to have been a perfect recovery, this man returned two years later with the same symptoms as he had before. I did another laminectomy. I came down upon another tumor of exactly the same size and appearance. I had left the little meningeal stalk of this tumor, and from it another had grown. On this second occasion I was careful to remove the dural attachment, and he again made a perfect recovery.

I use a somewhat different method from Dr. Mixter for removing the laminae, by using a succession of Doyen burrs. I think it lessens the possibility of contusing the cord, and we must all agree gentleness is essential in work on the central nervous system.

William Jason Mixter: I gladly accept Dr. Cushing's correction.

Laminectomies in malignant disease are unjustifiable, although they have been advised. A German surgeon advised laminectomies on all cases of tumors of the spine for relief of pain. I have never felt that that was justifiable. This case, which I have done recently, following carcinoma of the breast, was done because there was a good deal of difference of opinion; it was felt that the tumor was a dural tumor and not carcinoma, on account of the length of time that had elapsed since the operation was done.

Dr. Cousins: How do you relieve the pain, Dr. Mixter?

Dr. Mixter: Large doses of morphia. A plaster jacket helps if the spine is weakened. Morphia alone is the only relief for many cases.

Boston Dispensary Evening Clinic.—The Boston Dispensary has established a clinic for the treatment of diseases of the nose, throat, ear and eye for those who are at work during the day and are unable to afford the usual rates charged by specialists for such services. Fees are charged covering the cost of the service.

Original Articles.

GASTRIC ULCER PRODUCED BY INTRAVENOUS INJECTION OF STAPHYLOCOCCUS PYOGENES.

By Edgar C. Steinharter, B.S., M.D., Cincinnati, Ohio,

Attending Gynecologist to the Cincinnati General Hospital.

(From the Pathologic Institute, Cincinnati General Hospital.)

In a preliminary note (Boston Medical and Surgical Journal, May 11, 1916) I reported that:

I. Typical peptic ulcers varying from one-fourth inch to an inch in diameter, were produced by injecting locally into the stomach wall the staphylococcus pyogenes of certain grades of virulence and a weak acetic acid solution. Not all staphylococcus cultures would answer the purpose—an organism of special virulence (for instance, one freshly isolated from the appendix of a rabbit) was necessary to produce the lesion.

(*a*) The injection of the organism alone usually caused the development of a small, localized and firmly walled-off abscess at the point of injection. Such an abscess as a rule was absorbed in the course of four to six days, and never showed any involvement of the mucous or peritoneal coats. In some cases no abscess was formed.

(*b*) The introduction of the acid alone into the stomach wall, beyond causing more or less edema, provoked no gross pathological change in the tissues; but it did seem to increase the susceptibility of the area for localization of certain grades of staphylococci injected into the general circulation.

II. The tendency of selective localization in certain organs was found to depend, among other things, upon the virulence of the organism, and could be modified by cultivation of it in functionating tissue.

A little later (Boston Medical and Surgical Journal, July 13, 1916), in an article on acute arthritis experimentally produced by intravenous injection of the staphylococcus pyogenes, I called attention to the fact that experimental results showed that while the staphylococcus might exhibit a predilection for a particular region of the body, it would not always produce a gross lesion at the expected point of attack, and that, in order to produce a gross lesion, it was necessary for the staphylococcus to be of a certain grade of virulence, or for the tissue in which it had lodged to be suitably altered for the growth and action of the organism. This principle demonstrated itself repeatedly in the course of experimental production of acute gastric ulcer, and again in experimental production of acute arthritis.

It is in reference to acute gastric ulcer, developing as a result of intravenous injection of the staphylococcus of certain grades of virulence, that the following remarks are made.

FIG. 1. Photograph of a staphylococcus focus in the subperitoneal tissue of the pylorus of the stomach of a rabbit injected intravenously two days previously. The focus is just beyond the visible termination of the blood vessel.

The ulcers formed were in most cases single, but in some cases multiple. They occurred invariably in the pyloric end of the stomach or duodenum. They varied in size from that of a pinhead to 5 x 7 mm. In some cases they were punched out, clean and well circumscribed, and in other cases merely necrotic bleeding areas. In some experiments the ulcer was the sole lesion, while in others it was associated with appendicitis, cholecystitis, arthritis.

The organisms were obtained from two sources, namely, the blood of a case of septicemia in man, and an acutely inflamed human appendix. The primary cultures in both cases were made in ascites dextrose broth, and yielded the staphylococcus in pure culture.

In so far as it was possible to determine, each was the etiological factor in the production of the particular disease with which it was associated. (This point will be further discussed in a later article on appendicitis.)

An emulsion of the staphylococcus which was isolated from the appendix produced, on intravenous injection into the rabbits, without any preliminary animal passage, stomach or appendiceal lesions in four out of five rabbits injected. On the other hand, the strain of staphylococcus obtained from the case of human septicemia was not, when freshly isolated, of the proper grade of virulence to produce gastro-intestinal lesions when injected intravenously into animals, but later, after the organism had undergone preparatory cultivation in the functionating stomach wall of the rabbit, intravenous injection of it was then followed by the formation of gastric ulcer. In the course of successive passages through the functionating stomach of the rabbit, it was found that the staphylococcus showed a variable virulence and affinity for certain organs and tissues. For example, after two successive cultivations, the staphylococcus showed a marked affinity for the intestinal tract by localizing subperitoneally in the pyloric end of the stomach five times and in the appendix three times in the eight rabbits injected. In this series none of the rabbits showed arthritis or pericarditis. Further cultivation of the staphylococcus in three more stomachs, followed by intravenous injection, showed a falling off in the affinity for the intestinal tract, as only one out of four rabbits showed an intestinal focus, but the organism now exhibited a predilection for the pericardium, as all of the rabbits developed a fibrinous pericarditis. Still none showed arthritis. However, after passage through another stomach wall (that is, the sixth), eight out of eight rabbits now injected intravenously developed arthritis, one showed pericarditis, and two developed gastric ulcers. The technic employed was as follows:

The appendix of the human body was removed with care, to protect it from contamination, and kept under sterile conditions. On the same day it was excised, a portion of its wall showing inflammatory changes was washed thoroughly with sterile salt solution; then a small area of the peritoneal coat, outlined by means of a cutting needle, was lifted up and stripped off the subjacent tissue. The edematous fluid of the latter was planted on agar and in 150 cc. ascites dextrose broth, and incubated at 37° C. for about 24 hours. The broth cultures were then centrifuged, the solution decanted, and a suspension made of the sediment by shaking it up in

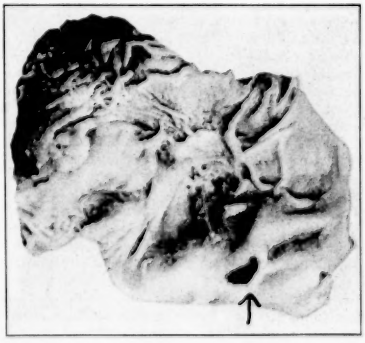


FIG. 2. Photograph of ulcer of stomach—natural size of ulcer, 5 x 7 mm.

30 cc. of normal saline. The broth culture of the blood from the case of septicemia in man was incubated for 48 hours and subcultured on agar and Loeffler's blood serum.

In most cases, agar cultures made directly from the tissues or subcultured from the saline

Fig. 3. Section through small ulcer of the stomach of a rabbit.

emulsions of the broth sediment were used in making emulsions for intravenous inoculation. Such emulsions were prepared by suspending the growth of an agar slant in 10 cc. of saline. The dose of emulsion employed varied from one-fourth to one cc. for a rabbit and three cc. for a dog. The intravenous injections were made in the marginal ear vein of the rabbit and in the femoral vein of the dog. Suspensions were always examined and subcultured before they were injected.

Animal passage was accomplished by opening the peritoneal cavity of the rabbit, and introducing a saline emulsion of the staphylococcus through a hypodermic needle into the tissue of the pylorus. After one to five days the animal was killed and cultures of the injected stomach area were made in ascites dextrose broth and on agar.

REPRESENTATIVE PROTOCOLS.

Rabbit 140. Two-thirds grown. Injected intravenously with ¾ cc. of an emulsion made from a 3-day-old agar growth of the staphylococcus of human septicemia which had undergone its fifth successive passage. On the fourth day after inoculation the rabbit appeared to be losing weight and showed slight lameness, but did not seem very sick. It was killed the same day with a blow on the head. The stomach on the peritoneal surface shows a puckering at the pyloric end, but otherwise is normal. At a corresponding area on the mucous sur-

Fig. 4. Low power of a mass of staphylococci in the tissue of the submucosa of the duodenum.

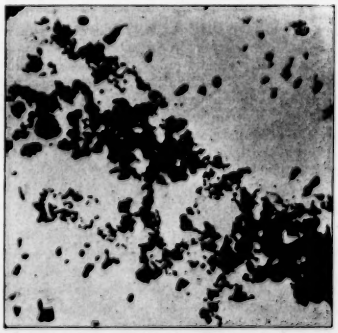


Fig. 5. High power of area indicated in No. 4, showing staphylococci and leucocytes.

face there is a deep, punched-out ulcer 5 x 7 mm. The base of it is covered with blood, and about one-half inch away from it are two small erosions. Considerable digested blood lies free in the gastric cavity. The right knee contains slight amount of turbid fluid; the other joints are negative. Heart, kidney, lungs and gall-bladder are negative.

Cultures of the right knee and stomach yield staphylococci in pure form.

Culture of the blood is negative.

RABBIT 163. Two-thirds grown. Injected intravenously with 1 cc. emulsion of an agar growth obtained by culturing human appendix subperitoneally 24 hours after onset of acute appendicitis. On the third day after inoculation the rabbit appeared normal; on the fourth day it looked sick and did not eat. It was killed the same day with a blow on the neck. All organs except the stomach are negative. The peritoneal coat of the stomach at the pyloric end reveals numerous ulcerations quite similar to those found on the mucous surface of the human appendix, from which organ the staphylococcus was originally obtained.

DOG. Female, weight, 11 kilos. Injected into the femoral vein with 3 cc. of an emulsion of a 24-hour-old agar culture of an acutely inflamed knee of rabbit No. 56, which animal, in addition to having an arthritis, showed an acutely inflamed appendix.

Prior to being injected into rabbit No. 56 the staphylococcus organism had been recovered from a case of septicemia in man, inoculated into rabbit No. 27 and cultured from the knee of 27, showing arthritis. The organism was then passed through stomach wall No. 32, recovered from same and inoculated intravenously into 45, where it developed a stomach focus. This focus was cultured, and the growth was injected intravenously into rabbit No. 56.

The day following inoculation, the dog seemed normal and ate about three pounds of meat. On the second day, after injection, she began to look sick and moved about with little energy. On the third and fourth days she would not eat, and lay stretched out in her kennel. Her abdomen was tender, rigid and spastic to the touch. The floor of the kennel was partly covered with recently coagulated blood. The animal was etherized and autopsied at the end of the fourth day; weight, 9 kilos. While being etherized, considerable dark unclotted blood was discharged by rectum. Knee joints show slight redness of periarticular tissue and cloudiness of joint fluid. Elbow joints negative. Stomach shows a few hemorrhagic erosions. The duodenum shows, about two centimeters from the pyloric ring, a necrotic area measuring 6 x 7 mm. The center of it is a bleeding point, and apparently the chief source of blood found in the lower bowel. There are numerous small hemorrhagic erosions throughout the duodenum. The ileum, jejunum and large bowel, except for the presence of blood in the latter, are negative. The appendix shows the mucosa to be thickly studded with punctate hemorrhagic elevations. The kidneys are congested; the gall-bladder is negative. Cultures of the duodenal ulcer, duodenal and gastric erosions and appendix show a mixed growth of the staphylococcus and colon bacilli. Culture of the heart's blood shows a growth of the staphylococcus in pure culture.

MICROSCOPIC ANATOMY.

Consequent upon the invasion of the tissues of the stomach by the staphylococci, which may be found either in mucosa or submucosa, there develops a circumscribed hemorrhage, then a leucocytic infiltration followed by a necrosis. Later there is a sloughing of the necrotic area. The ulcer formed thereby shows a base either clean or covered with blood. As a rule, the necrosis begins at the free surface of the mucous membrane, and proceeds downward. The glandular tissue immediately about the margin of the ulcer shows little change from normal, although organisms can at times be found in the interstitial areas. The submucosa and mucosa, too, beneath the crater may present a picture of acute inflammation with hemorrhage and reveal masses of staphylococci.

CONCLUSIONS.

The results of the experiments indicate that gastric ulcers resembling those in man can be produced in rabbits and dogs by intravenous injection of the staphylococcus pyogenes. Ulcer develops when the organism injected is of the proper grade of virulence and shows an inherent tendency to localize in the gastro-intestinal tract. Such qualities characterized the staphylococcus freshly isolated from an acutely inflamed human appendix, but the staphylococcus isolated from a case of septicemia showed these qualities only after cultivation in functionating tissue.

In the light of my experimental results, it seems probable that the staphylococcus is responsible for certain cases of gastric ulcer in man. That the organism may be present in gastric ulcer of human beings, is borne out by the work of Cellar and Thalheimer,[1] who found, among other bacteria, the staphylococcus in 7 out of 9 ulcers examined. Owing to a dearth of material for a similar study, I am unable to offer at the present time any statistics as a result of my personal investigation of this phase of the subject.

Many thanks are due to Drs. Paul G. Woolley and William B. Wherry for helpful interest shown throughout the course of this work, to Dr. Joseph Ransohoff, for some of the acute human appendices furnished, and to Mr. Oscar Haude for the pathological preparations and photographs.

[1] Bacteriological and Experimental Studies on Gastric Ulcer. Journal of Experimental Medicine, June, 1916.

THE NEW BOSTON LYING-IN HOSPITAL.—The JOURNAL has in previous issues noted extensively the plans being made to build on Longwood Avenue, near the Harvard Medical School, a new Lying-in Hospital, to provide larger and better accommodations than now afforded by the building on McLean Street. The sum necessary to cover this new building has been subscribed, with the exception of $75,000.

REMARKS ON THE DIAGNOSIS AND TREATMENT OF GASTRIC ULCER.

By Louis Fischbein, M.D., Boston.

A great deal has been said and written about the diagnosis and treatment of gastric ulcer, and the object of this paper, therefore, is, not to make any new contribution to the subject, but merely to emphasize a few points in the diagnosis and the treatment of this important affection.

There have come under my observation, within about eighteen months, twenty-six cases of gastric ulcer, twelve of which were seen within a period of six weeks. Of these twenty-six patients treated, eighteen were men and eight women, their ages ranging from twenty to sixty-two years.

SYMPTOMS AND DIAGNOSIS.

Pain two to four hours after meals was a very constant feature, and present in all these cases, but it varied greatly in intensity, character and location in different patients. It was of a boring, stabbing character in some cases, shooting from the epigastrium through the back between the scapulae, in others it was in the form of cramps across the abdomen, with or without pain or pressure in the back, while in still other instances it was more of a painful pressure in the epigastrium, or in the back, or in both. The pain was temporarily relieved, in some cases, by the taking of food or bicarbonate, in some by lying down or by changing the position from the left to the right side, or vice versa; in some cases cramp-like pains came on during the night, awaking the patients from their sleep.

Tenderness on pressure was not a marked symptom; when present it was found in the epigastrium, or between the epigastrium and umbilicus, and only rarely in the back, left of the eleventh dorsal vertebra, as described by Boas. In two cases both the pain and the tenderness were located in the right umbilical region, giving rise to a suspicion of appendicitis (which was actually diagnosed in one of these cases and the appendix removed, but the pains did not cease).

Vomiting of blood did not occur in any of these cases; vomiting of food occurred occasionally in three patients.

Pyrosis: this was present at times in all of the cases, and in some it preceded the pain by years.

Stomach contents: hyperacidity was found in most of the cases, the total acidity ranging from 60 to 130.

Food retention: the motility of the stomach was not determined, as the patients could not be persuaded to swallow the stomach tube twice, and since vomiting was of rare occurrence, the assumption was justified that food retention, if present, would be due to spasm and not to pyloric stricture.

Constipation was present in the majority of cases; it was rather surprising that some patients with severe gastralgias had normal daily evacuations.

X-ray examination was made in three cases, in two with negative results, and in the third it was questionable whether the examination showed ulcer or adhesions.

Loss of weight, in spite of a good appetite, was present in all cases.

Chronicity and periodicity of the symptoms was a marked feature in all cases, the symptoms having lasted from 2 to 7 years (in one patient 12 years, in another patient four months only). All patients claimed that there were weeks, and even months, in which they were free from pain, but whether they were also, in these intervals, free from slight gastric disturbances, could not be determined.

Occult blood in the stools as demonstrated by the guaiac test was present in all cases, and is to my mind the most reliable and the most characteristic symptom of gastric ulcer. Naturally, blood in the stools may also mean gastric cancer, but there are usually other signs and symptoms to differentiate between these two affections. Occult bleeding is apparently not present in gall-bladder disease, for in eight cases of gallstones in which the stools were examined within twenty-four to forty-eight hours after the attack the guaiac test was found negative. This "occult blood in the stools, when other sources of bleeding can be excluded, is, therefore, to my mind, pathognomonic of an ulcerative lesion in the gastro-intestinal tract, and in the absence of signs pointing to cancer, of gastric ulcer." All other signs and symptoms, single or combined, while suggestive, are not characteristic and are not sufficient to diagnose the disease with any degree of certainty. The typical hunger-pains, the gastralgias, the pyrosis, the vomiting, are certainly very suggestive, but are not present in all cases of gastric ulcer, and are, on the other hand, present in functional disorders of the stomach when these disorders are a part of a general neurosis. One would naturally hesitate over the diagnosis "neurosis" in the presence of severe gastric symptoms, the more so as many of these "neuroses" have in later years turned out to be gall-bladder disease, but that these severe symptoms do occur has been demonstrated to me, at least in one instance, in the most unique and absolute manner. It was in the case of a young woman with severe gastric pains, hyperacidity, and vomiting, and as an x-ray examination proved negative, and the therapeutic measures directed towards the stomach proved of no avail, a latent ulcer was assumed and the patient operated upon, but nothing abnormal was found, either in the stomach or in the gall-bladder; later, when treatment was directed towards the

general nervous condition, the pains ceased, and have not returned in about four months.

Some years ago, when there appeared a new edition of Hemmeter's "Diseases of the Stomach," a reviewer in one of the medical journals criticized the author for not mentioning that the pain in gastric ulcer is always worse when the patient is lying on his left side. I have since then carefully inquired into that symptom, and have found that it is as often absent as present.

Tenderness on pressure is emphasized by many authors, but I am convinced that this symptom is as frequent in gastric neurosis as in ulcer, and the same is true of hyperacidity. In fact, I am certain that the examination of the stomach contents yields practically no useful information, and in the presence of occult blood in the stools, it can be entirely dispensed with.

The occult bleeding is not only the most valuable sign in ulcer, but it is also the earliest sign of cancer, and in three cases of this latter disease the diagnosis of cancer was made months before any abnormalities could be demonstrated by the x-ray. Of course, none of my cases of gastric ulcer came either to operation or to autopsy, and the correctness of the diagnosis might, therefore, be questioned, but this is true in numerous other diseases where the clinical diagnosis is considered reasonably certain, so that one can, without being dogmatic, affirm in the disease under consideration: *Occult blood in the stools, in conjunction with chronic indigestion, signifies ulcer, either of the stomach or of the duodenum.*"

As to the performance of the guaiac test, I follow the method originally described by Boas, but instead of old oil of turpentine I use hydrogen dioxide. The precautions to be taken must be negative as well as positive. Meat must be excluded for at least two days, so that we can be sure that the blood found in the stools does not come from the meat ingested; on the other hand, some indigestible food should be given for the same length of time, on the supposition that if there is an eroded surface in the stomach which is liable to bleed, the heavy diet will cause it to do so and the blood will be detected in the stools.

TREATMENT.

The treatment of these cases and of a few others, not here included, is a modification of the original von Leube-Zimssen method, and its cardinal principles are: (1) rest in bed; (2) a bland easily digestible diet; (3) hot applications to the abdomen; and (4) alkalies to neutralize or to reduce the gastric acidity.

Rest in bed for at least ten days is absolutely essential, and this was forcibly illustrated in the case of two of my patients who, without rest in bed, carried out to the letter the dietetic and the medicinal measures, had blood in the stools after five weeks of treatment, in spite of increase of weight and of the disappearance of pain. If circumstances permit, or if blood is found in the stools after ten days, rest in bed for from three to four weeks is insisted upon.

DIET.

Feeding per rectum is illusory in the light of the newer physiology, which teaches that the stomach is practically never at rest. It might, however, be tried after a recent gastric hemorrhage, but as this did not occur in any of my cases, feeding was per os from the start.

The first four days a cup of boiled milk, warm, is given every 3 hours. On the 5th day gelatin with sweet cream flavored with strawberry juice is added. On the 6th day, chicken-soup, and one raw egg beaten up with butter, the eggs being increased to four on the 9th day. At the end of the second week, Robinson's barley, mashed tapioca, zwieback, masticated dry, and calves' brains in chicken-soup, are allowed. At the end of the third week, mashed potatoes, mashed rice, and boiled fish without the skin, are added. At the end of the fourth week, tender chicken, finely cut, and lamb chops, and in the middle of the sixth week, broiled steak, roast beef, mashed spinach, mashed carrots or turnips, and bread and butter, are added. The stools are examined, and when no occult blood is found, the patient is discharged, with written instructions as to diet, to be kept for at least three years, and perhaps during the rest of his life.

This diet has not only been uniformly successful in all cases treated, but it has served also in some instances as a diagnostic point between ulcer and cancer. In one case especially, a man 62 years of age, who had never before had any stomach trouble, and whose symptoms began only four months previous to the time when he came under treatment, there was some suspicion of cancer, but the beneficial effects of the treatment proved the diagnosis of ulcer beyond any possibility of doubt. With less certainty this diet helps to differentiate between gastric neurosis and ulcer, for it will only ameliorate the symptoms in neurosis, and not entirely remove them, as in ulcer.

Two objections will perhaps be made to the diet as here outlined: first, that the quantity of milk in the first few days will cause loss of weight, as it does not supply the calories required by the body at rest; and, second, that there is a large amount of the milk-curdling ferment in the gastric juice, giving rise to firm coagula, which act as solid food, irritating to the ulcer. The first objection has, to my mind, very little weight, for our chief aim is not to fatten the patient, but to cure his ulcer; the few pounds in weight lost in the first week are easily regained in the third, and at the end of the cure there is usually an increase of a few pounds over the original weight. The second objection may, perhaps, be true in theory, but is not so in practice, as the milk was readily taken and well borne by all patients, even by

those who insisted that milk never agreed with them. The only disagreeable feature about the milk is that it may at times cause diarrhea, but this is of no moment, as it disappears after a few days and does not necessitate an interruption of the cure.

Hot applications to the abdomen: How much these applications accomplish is difficult to state; they certainly exert a beneficial influence over the subjective symptoms, and by keeping the patient on his back they perhaps indirectly assist in the healing of the ulcer.

Medicinal treatment: Some recent observers believe they have demonstrated that in the rabbit the gastric juice does not prevent the healing of the ulcer, and the natural implication is that the same must be true in man. It requires no argument, however, to prove that conditions in the rabbit are not identical with those in man, and that the results of experiments on the former are not directly applicable to the latter. In many cases of purely functional disorders of the stomach with normal acidity, the symptoms are often relieved or improved by the administration of alkalies. There is apparently, in those cases, a hyperesthesia of the gastric mucous membrane, which reacts abnormally to even normal stimuli, hence the beneficial effect of the alkalies. The same must be true in gastric ulcer where there is, undoubtedly, a pronounced hyperesthesia of the gastric mucous membrane, and the employment of alkalies in this disease rests, therefore, on a fairly scientific basis, for if they do not fulfil the *indicatio morbis*, they completely fulfil the *indicatio symptomatica*. One-half teaspoonful of sodii citrici and magnesi ustae is given, one-half to one hour after each feeding, and when constipation is present a little pulv. rad. rhei. is added. Bismuth subcarb., one heaping teaspoonful in a glassful of water, is given mornings on an empty stomach, in the traditional belief that it forms a protective covering over the ulcer, no evidence having been adduced to prove the fallacy of this belief.

As mentioned above, the treatment here outlined has been uniformly successful, as all of my patients have gotten rid of their symptoms and of the occult blood in their stools; the question, "how long will they stay well?" I am, of course, not prepared to answer, yet there is sufficient reason to believe that the cure may be permanent. The earlier statistics of von Leube, Boas, and Ewald, according to which the ulcer recurs in 30-50% of the cases treated, cannot be taken on their face value, for various reasons, one of the reasons being that prior to the occult blood test there were no objective means to determine whether the ulcer was actually healed; they relied entirely upon the disappearance of the subjective symptoms,—which, as we know at present, does not signify a complete cure,—so that many of their relapses were more apparent than real. Furthermore their figures were mostly based upon hospital patients, who are much more apt to discard dietetic injunctions than is the case with private patients. Again, the intervals of freedom from pain, which are encountered in many cases, suggest a tendency in the ulcer to heal spontaneously. It would appear, then, from all these considerations, that with a proper diet, kept for years, simple, uncomplicated gastric ulcer may be permanently cured.

Note.—When the guaiac test is negative ulcer can be safely excluded, provided the proper precautions are taken. The diet, for about two days previous to the collection of the stools, must contain some heavy indigestible articles of food, and the stools examined must be solid, as a diarrheic stool is unreliable and misleading. Now, if no blood is found, ulcer can with great certainty be excluded. The course and the progress of cases in which ulcer was excluded have convinced me that the guaiac test is as valuable when negative as when positive.

PREPARATION OF VEGETABLE PROTEINS FOR ANAPHYLACTIC TESTS.*

By R. P. Wodehouse, and J. M. D. Olmsted, Boston.

[From the Medical Clinic of the Peter Bent Brigham Hospital, Boston.]

In a previous paper by one of the authors† it was shown how preparations convenient for use in skin tests in the diagnosis of asthma and other anaphylactic diseases could be made from some of the vegetable foods. Detailed descriptions were given for the preparation of most of the more commonly used cereals, nuts and other seeds, roots and tubers, fruits, and leaves and stems. Since these preparations have been found very satisfactory, the list has been considerably extended.

Briefly, the method employed is as follows: If the food in question is generally used in a cooked form, it was boiled in water, somewhat as if prepared for the table. The supernatant liquid was decanted, the liquid remaining in the pulp squeezed out, and the whole extract strained through cheese cloth. If, on the other hand, the food is generally used in the raw form, it was simply ground fine in a meat chopper and allowed to soak in two or three volumes of water for twenty-four or forty-eight hours (using toluol as a preservative). The procedure from this point on was the same in both cases. The extract was evaporated as dry as possible on a hot water bath (about 50° C.) with the aid of an electric fan. It was then redissolved in as

* These preparations were made for Dr. Fritz B. Talbot, Boston, and for the "Studies on Bronchial Asthma" at the Peter Bent Brigham Hospital.

† Wodehouse, Boston Medical and Surgical Journal, Vol. clxxv, No. 6, pp. 195, 196.

small an amount of water as possible, and precipitated by adding three volumes of 95% alcohol. Usually this gave a good precipitate, which could be removed by centrifuging, and when washed in a mixture of acetone and ether (4-1) and pure ether, could readily be dried in a desiccator. When desiccation was complete a friable substance was obtained which could be ground easily to a powder, and was always soluble in water or in dilute alkali (approximately 1% KOH).

The list of "protein preparations" made by this method now embraces the following:

Blueberries	Cantaloupe
Plums	Watermelon
Pears	Radish
Strawberries	Peanuts
Tomatoes	Cabbage
Peaches	Cauliflower
Grapes	Onions
Dates	Rhubarb
Figs	Sago
Grape fruit	Asparagus

A detailed description of each of these is unnecessary because the general method applies, without modification, to nearly all cases. The extract from cantaloupe, strawberry, blueberry and grape, however, instead of forming a good precipitate with 95% alcohol, became syrupy or gummy, and had to be triturated or macerated in hot absolute alcohol, then ground in acetone and ether to bring about complete desiccation.

In the case of tomatoes only an extremely small amount of the finished product was obtained from a very large amount of seed-free pulp. Therefore the seeds were dried and ground in a mortar, and from them a fair amount of protein was obtained by the usual method.

In the case of grapefruit, expressed juice was found to be strongly acid, and so was neutralized by adding KOH. At neutrality a flocculent white precipitate was formed which, upon being centrifugalized, floated to the surface, whence it was removed, washed in alcohol, and dried in the usual way. When the filtrate from this was examined, no further precipitate could be obtained, and as the filtrate was shown to contain no protein it was discarded. A watery extract, made by grinding and soaking the remaining pulp, was neutralized, made faintly alkaline and allowed to stand, when it took the form of jelly, and still retained this form, even when neutralized. When this was washed in alcohol, ground with absolute alcohol, acetone and ether, and dried in the desiccator, an extremely small amount of gray powder was obtained. Upon investigating the seeds it was found that a fair amount of protein could be extracted from them in the usual way.

In the case of watermelon a pale yellow juice was strained out by pressing the ground pulp in a muslin bag. After filtering, this was dried on the water bath, and the residue redissolved in as small an amount of water as possible. This gave a good precipitate when added to three volumes of 95% alcohol. When this precipitate was removed and dried in the usual way a grayish powder was obtained which is called "Watermelon preparation A" to distinguish it from the following. When the alcohol by which this had been precipitated was examined, it was found to give a precipitate upon further addition of alcohol, so 1/5 volume of 95% alcohol was added, and the whole allowed to stand for two days, when a large amount of white crystalline substance settled out. This was removed, washed and dried in the usual way, and is called "Watermelon preparation B." The chemical nature of this substance has not been determined. It is not of a protein nature for, although it gives the xanthoproteic reaction, it does not give the biuret nor Millon's test.

Protein tests were applied to all of these preparations. In none of those made from fruits, except from dates and figs, could protein be detected by chemical means. In the preparations from dates and figs, the protein could be demonstrated, and their reactions with phosphomolybdic and phosphotungstic acids showed them to be of the nature of peptones or proteoses. No protein could be detected in the preparations from cantaloupe or sago, and only minute amounts could be found in "Watermelon A," radishes and rhubarb. In the others, however, the presence of protein was shown both by the color tests and by the precipitation reactions, which latter showed that it existed in these preparations usually in the form of proteose or peptone.

SUMMARY.

The method described in an earlier paper for obtaining "protein preparations" suitable for use in making skin tests has been extended to include most of the commonly used vegetable foods. The preparations made from the fruits, in most cases, do not contain protein in demonstrable amounts, but those made from other vegetable foods generally consist largely of protein.

AN IMPROVED BLOOD TRANSFUSION TUBE.*

BY WILLIAM REID MORRISON, M.D., BOSTON,

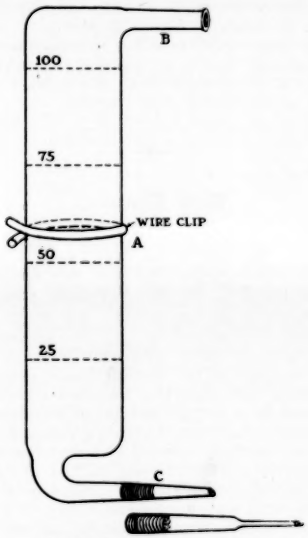
Assistant in Anatomy, Harvard Medical School.

(From the Laboratory of Surgical Pathology, Harvard Medical School.)

AFTER using the paraffin-coated glass cylinders of Kimpton and Brown, at the Boston City Hospital, and later at base hospitals in France, it occurred to the writer that certain alterations in the tube would be of advantage.

The accompanying drawing represents the new model tube.

* Demonstrated at a meeting of the East Boston Medical Society, February 27, 1917.



For convenience two sizes are made, according to the amount of blood to be transfused. One cylinder is of three hundred and fifty cubic centimeter capacity, four centimeters in diameter and thirty centimeters long, primarily for adult patients. The smaller size, three centimeters in diameter, and twenty centimeters in length, of one hundred cubic centimeter capacity, is for infants especially.

The tube consists of a good quality glass cylinder, "A", with a tube, "B", four millimeters in diameter, placed at the junction of the side and end of the cylinder. A cannula, "C", is situated at the other end of the cylinder. This cannula tapers from a tube of four millimeters to two millimeters diameter, at the tip, for the large cylinder, and the smaller cylinder cannula tip measures one millimeter in diameter.

The standard glass tubing manufactured varies slightly in width, therefore each cylinder is carefully graduated separately.

Each completed cylinder has an excess capacity of about twenty-five cubic centimeters to allow the surgeon a margin of safety in transfusing fixed amounts of blood, and also to prevent air embolism.

The tube "B" is for the outflow of air during the filling of the cylinder with blood. The donor's blood pressure fills the cylinder, the blood flowing in through the cannula "C". If a needle is attached to the cannula "C", a suction bulb may be connected with the tube "B", to aid the flow of blood in through the needle.

There is a ground glass collar on the cannula for the attachment of Vincent's needle particularly.

To empty the cylinder, a cautery bulb, or bulb syringe, and rubber tubing is connected to "B", and air is forced into the cylinder, driving the blood into the recipient's veins.

A safety-valve attachment to the rubber tubing may be used, such as is found in blood pressure apparatuses, for the release of air pressure.

The position of "B" is to prevent loss of blood after filling the cylinder, when the surgeon tilts the tube on its side. The tube "B" points in the same direction as the tip of the cannula "C", for the same reason.

The cylinder "A" is not made of heavy bottle glass, because of the danger of cracking the glass with change of temperature in cleaning the tube.

The cannula "C", for insertion in the blood vessels of donor and recipient, is of Vincent's model, which differs from Kimpton-Brown's in that it is simpler, and has no right-angled turn in it, which the writer deems unnecessary.

The cannula is attached to the side of the base of the cylinder, and runs across its greatest diameter, thereby affording protection to the cannula, which is lacking in Vincent's tube.

An adjustable wire clip holds the cylinder in any position on the table, thus lessening the danger of breaking the cannula, or tube "B", if the cylinder rolls from side to side.

The cork-stopper in the Kimpton-Brown and Vincent tubes, and their modifications, is eliminated.

Its disadvantages are: first, when coated with paraffin, the stopper may fall out of the cylinder to the floor, causing the surgeon to lose most of the blood in the cylinder, if the tube is not held upright, and his finger slips off the cork; second, if the tip of the cannula is against the wall or a valve in the vein too tightly, air pressure from the cautery bulb may force out the stopper, which rolls on the floor, and adequate air pressure is then impossible, even though the operator's hand is firmly applied to the opening; third, it is doubtful if any cork stopper can be thoroughly sterilized; fourth, glass cylinders vary in size, and even though three different-sized stoppers be carried by the manufacturer, certain cylinders prove to be too large, or too small, for any of these stoppers.

The only advantage a stopper at one end of the cylinder has is easy access for cleaning, but very hot soap solution or hot alcohol readily cleans the tube.

Rubber and glass stoppers can be sterilized more readily, but they, too, have the disadvantages of the cork ones, and are relatively quite expensive.

Safety-valve glass tubes, controlled by the surgeon's finger, have been used in the stoppers to avoid air embolism, in addition to the tube "B" for the cautery bulb, but merely pinching the rubber tube of the cautery bulb, and removal

of the nearly-emptied cylinder from the vein, prevents air embolism.

The glass cylinder is, of course, cleaned, and sterilized in an autoclave; then all moisture is driven out of the tube by heating over a Bunsen burner, for if there is any water left inside, a good coating of paraffin is impossible. In aseptic hands, the cylinder and needle, warmed over the flame, are coated with Vincent's mixture, or with "parowax," which is sterilized and melted on a water bath, or over a Bunsen burner, and poured in readily by a heated medicine dropper, or pipette.

I wrap my tubes, clip, and needle in one layer of folded sheet wadding, held in position by tape, and enclosed in a towel and taped. An extra towel is, in turn, wrapped around the inner towel, and held by tape, instead of pins or rubber bands, which are less efficient. The cylinder and coverings are sterilized in an autoclave, then the outermost towel is removed by an assistant, and the surgeon aseptically removes the cylinder from its inner coverings, on a sterile sheet, and coats the cylinder as above. After cooling, the tube is returned to its sterile coverings, and the outermost towel is reapplied as it was taken off.

Sterile salt solution may be used as a coating for the tube, if no paraffin mixture is on hand.

After a transfusion, the cylinder may be cleaned of blood readily by filling it with cold water, and shaking until any clots are broken up. A stream of water may then be passed through the cannula "C", forcing out any clots through the tube "B," holding the cylinder upright.

The paraffin mixture is removed by immersing the cylinder in a cold soap and water solution, and gradually heating, by the addition of very hot water, until an emulsion of the mixture is made. The paraffin is then forced out of the cylinder by a stream of hot water as above mentioned.

Alcohol may be poured into the tube conveniently by a medicine dropper or pipette, and heated over the flame, readily dissolving any paraffin remaining.

Through the courtesy of Dr. Edward H. Nichols, facilities were afforded for experimental work in the Laboratory of Surgical Pathology. Dr. Woody kindly assisted the writer in the work.

I wish to acknowledge many valuable suggestions given me by Dr. Walter R. Bloor of the Department of Biological Chemistry, Harvard Medical School, and by Mr. Wiggin of the Victor Electric Corporation of Cambridgeport.

Since writing this article, I have successfully transfused, by means of the small-sized tube, a private case of hemorrhagic disease of the new born, in a child one day old. The median basilic vein of the father was isolated by dissection, and the blood was removed directly by means of the cannula, then injected into the child through the anterior fontanelle into the superior sagittal sinus, by means of Vincent's needle.

The larger sized tube has recently been used satisfactorily by Dr. F. B. Lund and myself, in a case of hemorrhage from the stomach in an adult, at the Boston City Hospital. .

Book Reviews.

The Medical Clinics of Chicago. Vol. 2, Nos. 1, 2, and 3, July, September and November. Philadelphia: W. B. Saunders Company. 1916.

A dozen or more men contribute to these three numbers of the Medical Clinic some very interesting case reports. The case reports are enlivened by a varying amount of correlated information concerning the disease discussed. The cases are carefully selected and are of considerable interest. The informal method of presentation will doubtless appeal to many practitioners who want a running commentary on a medical case rather than exhaustive discussion of the disease.

Public Health Nursing. By MARY SEWALL GARDNER, R.N. New York: The Macmillan Company. 1916.

Within recent years the rapid development of the public health nursing movement has led to the formation of an entirely new department in the nursing profession. This monograph by Miss Gardner is perhaps the first comprehensive presentation in English of the history of this development, of the technique, method and organization of visiting nursing agencies and organizations, and of the various branches which have developed within the department of public health nursing, dealing with special aspects of the subject such as tuberculosis, child welfare, school nursing, mental hygiene, industrial nursing and medical social service. The author's statements on all these subjects are based on her own experience as superintendent of the Providence (R. I.) District Nursing Association. There is an introduction by M. Adelaide Nutting, professor of nursing and health of Columbia University, pointing out the relation of public health nursing to early forms of nursing, and to other factors in the movement for community health and hygiene. An appendix presents a chronicle history of the development of public health nursing from the time of the Knights Hospitaller. There is also an account of the national organization for public health nursing of which the author of this excellent compendium is president.

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ERNEST GREGORY, *Manager*,
126 Massachusetts Ave., Corner Boylston St., Boston, Massachusetts.

THE FOOD VALUE OF MILK.

A GREAT deal has been said and written about the food value of milk—about the number of food units it contains, its caloric value, and about its great digestive and absorptive properties. Yet an analysis of all the facts bearing upon the value, and especially the availability, of a food like this does not entirely justify its wide use as a beverage, particularly when it is considered that the value of milk is largely modified by dangers almost peculiar to it from bacterial contamination at the source, or from pathological changes taking place in it during transportation.

Biologically, milk is the ideal food for the young of all mammalia, whether from the standpoint of quantity, concentration or quality. It is particularly ideal, because Nature intended that it be consumed at the source of production by its young. Because so very perishable, it could never have been intended for transportation as such for long distances and under the many adverse conditions incident to transportation. Yet milk has been largely subverted from the young to the use of the adult, as well as to the manufacture of the many milk products. It is the great adult demand for this food that has made it so expensive and so difficult to obtain for the young. In order to reach this large demand, it has been necessary to exercise great care in production and to haul great distances under expensive and far from satisfactory methods of preservation. Unless this is carried out, milk can become a dangerous poison, being a culture medium of highest quality. Nevertheless, even with all the care exercised, the ever-present danger from milk cannot be entirely eliminated.

Unless, therefore, milk is an indispensable food for adults and must be obtained for them despite difficulties in production and transportation, as well as cost, there is little justification in its extended use by adults to the prejudice of the young.

Although milk is a well-balanced food, only about 11% of the best milk is solid food in solution. In order to obtain this amount of food it is necessary to run through the system about 89% of water—a highly bulky and wasteful method of feeding. Besides, even this small amount of food must be taken in a highly perishable and always potentially dangerous form. Moreover, the elimination of the large quantities of fluid necessarily taken with a generous milk diet puts a heavy tax on the organs of elimination—particularly the glomeruli—and becomes a positive contraindication in nephritic as well as circulatory conditions, where milk is so often erroneously prescribed as "light" diet. In health an adult has little reason for consuming a highly digestible food, while in disease it may be objectionable for the reasons already stated, as well as in conditions where the digestive apparatus cannot overcome even the normal milk curd.

Except as the intake of large quantities of water has a tendency to increase body weight, milk does not of itself act as a "fattener." Indeed, milk diet alone is often prescribed to reduce weight. On the basis of an adult food ration, very large quantities of milk have to be taken continuously. On the other hand, milk is very poor in mineral matter, especially in iron. Children who are kept on an exclusive milk diet

for a long time become anemic, rickety, and, if the milk is always boiled for safety, have a tendency to scorbutus.

The adult value of the milk products—butter, cheese, cream, etc.—lies entirely in their concentration and small volume. All the food value is represented in the volume consumed. Preservation and transportation of these products represent problems infinitely less than with milk, mainly because of the small volume.

The usual milk scarcity and difficulty with its extravagant cost for the young would be obviated should we demand less milk and more of the milk products. Much of the cost and scarcity is due to losses from improper preservation or production at the source, loss from deterioration in transit, and the cost and difficulty of transporting the small amount of food content in the great water volume. Milk should not be too extensively used as a food by adults. The cost of producing, preserving and transporting the relatively small part of the milk demand of the young would not then be so prohibitive nor present so profound a problem.

MEDICAL PHASES OF THE NEW IMMIGRATION LAW.

THE new immigration law, just passed over the President's veto, is by far the most comprehensive measure yet drawn for the protection of the native population from alien sources of contamination. The medical aspects of this law are especially important in this respect. In the matters of diagnosis the law allows at least as much latitude to the medical officers as would be allowed them in ordinary clinical work. Previously, diagnoses of physical and mental conditions had to be based upon data almost quite beyond that required in medical diagnosis. The result was that exclusion for such mandatory conditions as tuberculosis or mental defect or disease was extremely low when compared with the large number of the alien population inhabitant in public institutions. The public institutions of the various states made frequent and just complaints about this state of affairs. And, while other factors, beside failure to apprehend on entrance, caused this large disproportion between alien and native inmates, yet the factor of failure to exclude on entrance was much the predominant element in this condition.

For example, under the old law, only certain forms of tuberculosis could be certified as such, and then even the tubercle bacillus had to be demonstrated. Even clinically, only a very small number of the positive cases demonstrate the bacillus in the sputum. Under the new law, all forms of tuberculosis receive recognition.

Similarly, the problem of the insane and the mentally defective, and the part the immigrant plays in furnishing new "foci of infection," is now afforded proper weight. It is evident that if the requirements for the certification of the insane at the time of inspection require some overt action or speech, the number of those who can be certified must be very low, whereas the large number of the potentially or even latently insane must escape, but yet succumb to the first adverse condition met with in their new environment, and become a charge upon the public. Likewise, the mentally defective, except the most profound, do not always fail in the still rather crude mental tests thus far devised and set before them, even though the mildest personal contact between the experienced examiner and the subject will detect the inferiority. Moreover, while the defective can be educated to do the simple tests like the Binet-Simon, or its modifications, his actual deficiency nevertheless shines through the thin veneer of training. Under the old law, however, these could not be certified unless they came under one of the three classic divisions of the defective,—the idiot, the imbecile or the moron. Under the new law, the provision calling for the certification and the exclusion of the constitutionally psychopathically inferior, all the potentially or latently defective or insane can be included. There is no doubt that no matter how large the distinctly defective population held under custody, that not considered severe enough for custody but which is, nevertheless, the progenitor of later generations who must be held in custody, is very much larger. It is the augmentation of this large class that this provision in the new law seeks to limit.

In a medical way the much discussed literacy test has a value only because it will undoubtedly blanket out whole classes of the inferior. Even if the illiterate are not by heredity defective, it must be remembered that the exercise of reading and writing is a very important stimulus to the development of the mind. It is for this reason that writing is so important a factor in the training of the mentally defective. In literate

circles, the presence of an illiterate is almost certain to be caused by mental deficiency. Literacy is a factor in general life efficiency and health, so much so that insurance companies refuse to accept illiterates as bad risks.

The diagnosis of the constitutionally inferior is not without difficulty, and to many it may appear as a rather vague medical condition—one too vague on which to base an excluding medical certificate. Yet this same difficulty was encountered when the more definite mental conditions were first certified, but the study of these conditions will soon perfect surer means of diagnosis.

THYMUS DEATH.

FROM time immemorial there have existed refuges for the physician who chose to take advantage of them, at a loss for the diagnosis of an illness or to assign the cause of death. Malaria, grip, "threatened with pneumonia," "threatened with typhoid fever," rheumatism, and many other old standbys, are quoted to the anxious family who wish a diagnosis when the doctor is putting on his overcoat after his first visit. Then, when the young or the old die unexpectedly, he may, in the lack of any definite knowledge, write in the cause of death as meningitis, entero-colitis, bronchitis, chronic myocarditis, arteriosclerosis, or, in the case of children, the most satisfying and mysterious of all, "thymus disease."

This latter diagnosis is particularly apt to be given if a child, whose heart and lungs have been found to be normal, suddenly dies in the early stage of an anesthetic and the thymus is found at autopsy to be enlarged, or if a sudden attack of dyspnea causes death. Then, too, death may occur unexpectedly in the course of some disease not considered essentially dangerous, such as bronchitis, rickets, or a diarrhea. Post mortem then reveals an enlarged thymus and an abnormally developed system of lymphatic glands and follicles; "thymus death" then seems to offer an adequate explanation.

Recently Dr. J. A. Hammar in a Swedish medical journal,[1] describes his post-mortem examinations of sixteen cases of sudden death in infants and children, with especial reference to the relative amounts of cortex, medulla, and interstitial tissue in the thymus glands, and also to the relative and absolute numbers of Hassall's corpuscles in them, for the purpose of verifying the current impression that thymus death is frequently due to an excessive deposit of these in the gland. In all these sixteen cases there was more or less enlargement of the thymus, but in only two cases was there true thymus death, the other cases being due usually to some respiratory condition.

Dr. Hammar has also made extensive investigations into the histology of the normal thymus, and his conclusions are that in cases of sudden death from internal causes in infants and children, the thymus gland is, as a rule, normal, and must be absolved from all responsibility in the matter. We must look, he says, into the endocrinous glands generally with more minuteness.

[1] Svenska Läkaresällskapets Handlingar, Stockholm, 1916, xlii, 867.

MEDICAL NOTES.

INCREASE IN COST OF DRUGS.—A meeting of the Boston Association of Retail Druggists was held lately at the Massachusetts College of Pharmacy to consider the recent increased rise in the cost of many drugs. Since the outbreak of the European War there has been an average increase of 503% in the cost of all drugs, and individual drugs have increased much more than this, as is evident from the following table:

	Increase Per Cent.
Acetanilid	133
Acetphenetidin	1069
Acid benzoic	3155
Citric acid	33
Salicylic acid	357
Tartaric acid	353
Powdered alum	243
Antipyrine	472
Belladonna leaves	650
Bromide of soda	150
Calomel	203
Carbolic acid	446
Cream tartar	50
Sulphate of atropine	650
Glycerine	195
Naphthalene	233
Oxalic acid	934
Iodide of potash	25
Permanganate of potash	2694
Sulphate of quinine	260
Resorcin	3800
Rochelle salts	147
Salol	333
Saccharin	1483
Saltpetre	300
Benzoate of soda	1844
Salicylate of soda	187
Sugar of milk	166
Thymol	391
Thymol iodide	164
Sulphate of codeine	83
Sulphate of morphine	90

Arnica flowers	1466
Denatured alcohol	107
Witch hazel	19
Castor oil	100
Phenolphthalein	1300
Carbonate of guaicol	1919
Ichthyol	384
Gum camphor	111
Aspirin	100
Bismuth subnitrate	79
Caffeine citrate	93
Cocaine alkaloid	100
Digitalin powder	3566
Dovers powder	140
Ergot	50
Iodine	91
Iodoform crystals	61
Methyl salicylate	220
Novasprin	66
Bromide of potassium	538
Phenacetine	627
Salicin	233
Quinine sulphate	290
Castile soap	42
Olive oil	25
Cod liver oil	316
Sandal wood oil	233

UNITED STATES CENSUS BUREAU REPORT ON CANCER.—The United States Census Bureau has recently published its long-expected special report on the cancer mortality statistics of the United States registration area and its subdivisions, including the states, counties and principal cities, for the year 1914. The American Society for the Control of Cancer takes a just pride in the completion of this work, which was undertaken at its own suggestion and developed in constant coöperation with the Committee on Statistics and individual members of the board and of the society, who give their advice from time to time. The director of the census in transmitting the report for publication, makes generous acknowledgment of the services rendered by the society and the members of its Statistical Advisory Board.

This statistical monograph on cancer undoubtedly represents the most comprehensive and detailed work of the kind ever published by any government. While making use of an extended classification of organs and parts of the body similar to that which has appeared for some years in the annual report of the registrar-general of England and Wales, the American report goes further in offering for the first time a separation of the statistics according to accuracy of diagnosis as determined by surgical intervention, autopsy or microscopical examination.

The preparation of this report has occupied much of the time and labor of the Census Office for the past three years. The accomplishment justifies the effort, for the work places this country far in advance in the scientific collection and tabulation of the official mortality statistics of cancer. The foremost students of the disease have long agreed as to the importance of statistical investigations in throwing further light on the causes of cancer, and have urged that the official returns show the number of deaths in full detail according to organs attacked, and with due regard to age, sex and race. In answering this demand the United States Government has made a notable contribution to the scientific study of this formidable and apparently increasing scourge.

The report can be obtained by writing to the Director of the Census, Washington, D. C.

EUROPEAN WAR NOTE.

WAR RELIEF FUNDS.—On March 24 the totals of the principal New England relief funds for the European War reached the following amounts:

Belgian Fund	$544,876.62
French Wounded Fund	208,343.68
Armenian Fund	163,791.17
French Orphanage Fund	88,326.86
Surgical Dressings Fund	80,236.47
Polish Fund	63,551.19
Boston Ambulance Fund	54,859.56
LaFayette Fund	24,689.03
French Phthisis Fund	13,359.04
Friends' Relief Fund	7,052.50

BOSTON AND MASSACHUSETTS.

WEEK'S DEATH RATE IN BOSTON.—During the week ending March 17, 1917, the number of deaths reported was 266, against 267 for the same period last year, with a rate of 17.96, against 18.31 last year. There were 36 deaths under one year of age, against 51 last year, and 86 deaths over 60 years of age, against 78 last year.

The number of cases of principal reportable diseases were: diphtheria, 85; scarlet fever, 41; measles, 142; whooping cough, 4; typhoid fever, 3; tuberculosis, 54.

Included in the above were the following cases of non-residents: diphtheria, 12; scarlet fever, 7; measles, 4; typhoid fever, 1.

Total deaths from these diseases were: diphtheria, 6; measles, 1; typhoid fever, 2; tuberculosis, 29.

Included in the above were the following deaths of non-residents: typhoid fever, 1; tuberculosis, 1.

FOUR-COUNTY BASE HOSPITAL PLANNED.—The American Red Cross has started a proposition for a four-county base hospital of five hundred beds at $50.00 apiece. Although the beds will be provided largely by individual donors, there is great need of funds for supplies and equipments for the work. Berkshire Chapter has guaranteed to provide 200 beds, leaving 300 for Hampden, Hampshire and Franklin counties. Hampshire and Franklin counties could probably provide 100 beds, but Hampden leaders desire to exceed the 200 of the Berkshire Chapter. Already they have received an offer of 10 beds from one individual, and several of-

fers of single beds. Besides beds, the base hospital will need at least 25 doctors and 50 nurses. Berkshire county has secured the offers of service from seven physicians. The executive committee of Hampden Chapter discussed the proposition to divide the work of the county into two committees, one for civil relief, which will look after the needs of families of absent soldiers, in coöperation with existing relief organizations, and one for military relief, of which Dr. Philip Kilroy was named chairman.

MOBILIZATION OF MEDICAL RESOURCES OF THE STATE PLANNED.—A mobilization of the medical resources of the State, as a preparedness measure, is being undertaken by leading physicians and surgeons of Boston, who have organized under the name of the Auxiliary Medical Committee for National Defense of Boston. Dr. Richard P. Strong, professor of tropical medicine in the Harvard Medical School, has been chosen permanent chairman, and Dr. John Warren temporary secretary. Recruiting will begin immediately for the U. S. Army Medical Reserve Corps, the Medical Officers' Reserve Corps, and the Public Health Service. Among those who have allied themselves with the medical committee are: Dr. E. H. Bradford, dean of Harvard Medical School; Dr. C. F. Painter, dean of Tufts Medical School; Prof. R. P. Strong, director of the School of Tropical Medicine of the Harvard Medical School; Dr. E. H. Smith, dean of the Harvard Dental School; Dr. A. S. Begg, dean of the Harvard Graduate School of Medicine; Medical Director Leach, commanding officer of the Naval Hospital at Chelsea; Surgeon Leys, medical officer of the Charlestown Navy Yard; Col. Williams, surgeon-general National Guard of Massachusetts; Dr. W. L. Burrage, secretary Massachusetts Medical Society; Dr. F. A. Washburn, superintendent Massachusetts General Hospital; Dr. John J. Dowling, superintendent Boston City Hospital; Prof. Harvey Cushing, chief surgeon Peter Bent Brigham Hospital; Dr. C. A. Porter, Dr. F. B. Lund, Dr. Paul Thorndike, Dr. J. E. Goldthwait, Dr. John Bapst Blake, Dr. Robert B. Greenough, Dr. W. B. Cannon, Dr. Reid Hunt, Dr. Roger I. Lee, Dr. Elisha Flagg, Dr. Lincoln Davis, Dr. John Warren.

RING SANATORIUM AND ARLINGTON HEALTH RESORT.—The report of the thirty-seventh year of the Ring Sanatorium and twelfth annual report of the Arlington Health Resort has been issued to the medical profession by its medical director, Dr. Arthur Hallam Ring. A total of 204 patients have been admitted during the past year. In place of the usual elaborate statistics, the report consists chiefly of records of representative cases coming under the care of this sanatorium, with the purpose that the work and manner of treatment may be more clearly understood by the profession. The facilities and equipment of this sanatorium consist of two separate departments—the Ring Sanatorium, which is conducted as a hygienic institution; and the Arlington Health Resort, which is limited to cases of mild mental illness. There is also operated in conjunction with the establishment, a farm at Billerica, Mass., which has accommodation for eight patients. Plans are being made to build eventually on the farm a colony of bungalows for about one hundred beds, but this spring one building will be erected sufficient for fifteen beds to care for disturbed patients and to relieve the Health Resort at Arlington. A training school for nurses, under the supervision of Dr. Barbara T. Ring, is doing good work in giving specialized training to nurses in mental illnesses.

INFANTILE PARALYSIS IN WHITMAN.—The first case of infantile paralysis that has appeared in the Old Colony District this winter occurred on March 12 in Whitman. The patient, a child of two and a half years, has been removed to the Brookline Contagious Hospital.

SMALLPOX IN WORCESTER.—The third case of smallpox in Worcester was reported on March 13. The patient, a man of thirty-five, lived in the same house with two children who were stricken with the disease the previous week.

CONFERENCE ON ANTI-TUBERCULOSIS WORKERS.—The Instructive District Nursing Association held a conference, at its headquarters, of the anti-tuberculosis workers throughout the State on March 16th. Dr. Eugene R. Kelly, director of the State Department of the Board of Health, presided and delivered an address on Tuberculosis. He stated that the number of deaths from tuberculosis was decreasing, and attributed this to the efforts made by anti-tuberculosis work. He urged that there be no relaxation of this work. Dr. R. B. Greenough followed with an address on cancer, urging that treatment be given at the earliest possible moment. He stated that deaths from this disease are on the increase. Dr. Donald B. Armstrong, executive officer of the Framingham Community Health and Tuberculosis Demonstration, gave an address describing the experiment. Miss Annie Henry Strong of Simmons College and others made addresses.

SOMERVILLE MEDICAL SOCIETY ADOPT RESOLUTIONS.—At a recent meeting of the Somerville Medical Society resolutions were unanimously adopted offering a fully equipped medical company to President Wilson in event of war.

FALL RIVER TUBERCULOSIS HOSPITAL.—A new site for the proposed tuberculosis hospital in Fall River has been decided upon by the board of trustees and a committee has submitted the

decision to Commissioner McLaughlin for the approval of the State Department of Health.

SALEM HOSPITAL.—The Alumnae Association of the Salem Hospital is planning to raise funds for the building of a nurses' home in the new Salem Hospital.

MILFORD HOSPITAL. — Thursday evening, March 15, the Milford Hospital Association held its annual election of officers.

NORTHAMPTON HOSPITAL. — At a recent monthly meeting of the trustees of the Cooley-Dickinson Hospital, Northampton, the announcement was made of the gift of $400 for the Nurses' Home fund. This third gift caused some discussion as to the advisability of starting plans for the home. The Dickinson Hospital Aid Association, Northampton, desires to increase its membership in order to aid the work which the hospital is doing for those who are unable to pay anything for their treatment.

FRAMINGHAM HOSPITAL. — The Framingham Hospital has received an anonymous gift of $5000. It has also been announced that the gift of $4000 from the Frank E. Simpson estate would soon be available, with interest from November, 1915.

FRANKLIN COUNTY TUBERCULOSIS HOSPITAL. —Bids have been submitted for a tuberculosis hospital for the Franklin County Public Hospital, Greenfield.

NEW ENGLAND NOTES.

CONNECTICUT.—The Danbury Hospital has appealed to the legislative committee for an appropriation of $10,000 annually for the next two years, in order that the hospital may maintain the proper position.

NEW HAMPSHIRE.—The Portsmouth Hospital will receive the sum of $45,000 for the erection of an annex and operating room, and also the income from certain real estate to pay for the upkeep and running expenses of the same, from the will of John Jacob Pickering.

RHODE ISLAND.—Preliminary sketches are being prepared for a hospital to be built on Chalkstone Avenue, Providence, R. I., for the Providence Homeopathic Hospital.

The annual meeting of the Pawtucket Medical Association was held March 15. Dr. Charles H. Holt, superintendent of the Pawtucket health department, was elected president of the association. Dr. P. W. Hess delivered the principal address.

VERMONT.—The town of Bellows Falls has appropriated $1000 toward the support of the Rockingham hospital.

The Washington County Medical Society, at its quarterly meeting March 13, made tentative arrangements for a series of three clinical meetings to be held at Barre, Montpelier, and Waterbury or Randolph, the first of which will probably be held in Barre or Montpelier, where hospital facilities are available. Papers were read by Dr. Gifford, Dr. C. P. Chandler of Montpelier, and Dr. O. G. Stickney of Barre.

Harvard Medical School.

FELLOWSHIPS IN PREVENTIVE MEDICINE.—Several research fellowships in he Department of Preventive Medicine and Hygiene at Harvard are available for the scientific investigation of food poisoning. The work may at the same time be credited towards the Doctor of Public Health degree.

Candidates should apply to Dr. M. J. Rosenau, Harvard Medical School, Boston, Mass.

THE CUTTER LECTURES.—The Cutter Lectures on preventive medicine and hygiene were given on March 20, 1917, and March 21, 1917, at the Harvard Medical School, by Martin H. Fischer, M.D., professor of physiology, University of Cincinnati. The subject of the first lecture was "The General Physiology and Pathology of Water Absorption by Protoplasm," and the second, "Fats and Fatty Degeneration."

Correspondence.

THE YOUNG BILL: A SECOND REJOINDER.

Everett, Mass., March 9, 1917.

Mr. Editor:—

I wish to preface my second rejoinder to Dr. Rubinow by saying that if my assumption that the omission of "M.D." in his article in the daily press and its appearance in the MEDICAL JOURNAL was not intended on his part, that I apologize for my former assumption that it was. I don't think we can blame the printer too much, for the letters I have seen from Dr. Rubinow usually have his name printed on the letterhead with the title of both M.D., and Ph.D. after it.

While in many ways it is a small matter to take up space in a serious journal, yet in medical matters the truth is what medical men want and Dr. Rubinow's assumption that it would require 3566 beds, kept busy all the time, to supply the births of 60% of the entire population of Massachusetts is too large by over 60%. Dr. Rubinow rebuked me once for using too large an estimate of the number to be benefited under the Young Bill, and gave 60% of the population of 3,719,156, or 2,250,000, as a possible basis. Let him stick to his own estimates. While this discussion

is largely academic, if new hospitals were to be built it would be most important. In a way the printer boy played me a trick in my article in the Feb. 22 number, when I was made to say: "The same rate applied to Dr. Rubinow's estimate of 2,250,000 gives 92,978 births for the whole population." This is misleading. If 2,250,000 were omitted it would be what I intended to say. A careful reading of the whole article should have made it clear that 60% of the birth rate of the whole population was 55,786: 55,786 ÷ 26 (Dr. Rubinow's divisor) gives 2146: 3566 is 166% of 2146. This to me seems a matter of simple arithmetic.

Practically, of course, it would take more beds to care for these cases.

I fear I have not made my meaning clear in the past, and I am somewhat embarrassed by the tone of superiority, possibly unintentional, that seems to run through the writings of the proponents of this measure.

The general practitioners of medicine whom I know will look upon the estimates of the cost of medical care promised in the Young Bill as not adequate to do the work as well as it is done now under the conditions as we know them. A change presupposes an improvement. Certainly all maternity cases can't go to the hospital at present, but if the expectant mother is to get a service equal to the best, in her own home, with good nursing and all the rest, the cost must be more than the minimum hospital charge of $35.00 per case. Either the promises must be cut down more than 66% or the estimate of cost must be increased more than that.

If Samuel Gompers should persist in his declaration made before the Congressional Committee April 11, 1916, that he would rather incite a revolution than submit to this proposed measure of compulsory health insurance, what would your "American professors" say or do then? If any one is interested in reading of this hearing, it is found in the *American Federationist* for May, June and August, 1916.

Most of our patients are workmen and the practice of medicine does not help us to take the aristocracy of brains too seriously. Skilled manual labor, I believe, tends to develop as high a type of American manhood as can be found anywhere on God's green earth. The workingman deserves the best medical service possible, but I believe he has a right to decide how and by whom it shall be administered.

George E. Whitehill, M.D.

NATIONAL BOARD OF MEDICAL EXAMINERS.

Philadelphia, Feb. 28, 1917.

Mr. Editor:—

The second examination to be given by the National Board of Medical Examiners will be held in Washington, D. C., June 13, 1917. The examination will last about one week.

The following states will recognize the certificate of the National Board: Colorado, Delaware, Idaho, Iowa, Kentucky, Maryland, North Carolina, New Hampshire, North Dakota and Pennsylvania. Favorable legislation is now pending in twelve of the remaining states.

A successful applicant may enter the Reserve Corps of either the Army or Navy without further professional examination, if his examination papers are satisfactory to a Board of Examiners of these services.

The certificate of the National Board will be accepted as qualification for admittance into the Graduate School of the University of Minnesota, including the Mayo Foundation.

Application blanks and further information may be obtained from the Secretary, 2106 Walnut Street, Philadelphia.

Very truly yours,

J. S. Rodman, M.D., *Secretary.*

"SISTER" MEANING "NURSE."

Boston, March 2, 1917.

Mr. Editor:—

Is there any New England usage corresponding to that in Great Britain? There a member of a body of nurses, especially a head-nurse in charge of a ward, whether or not "in religion," is called "sister"; for instance, "Surgical Nursing and Dressing" (by C. P. Childe, London, 1916) is "dedicated to the Sisters and Nurses of the Royal Portsmouth Hospital." The earliest quotation in the New English Dictionary (ix. p. 106) is dated 1873, but a letter in (London) *Notes and Queries* for Feb. 3, 1917 (12 series, Vol. iii, p. 89) gives a quotation of 1731 (the St. Bartholomew's Hospital resolving that annual payment be made to "..... the sisters of all the other wards, £30, nurses, £20.") and says: "but 'sister,' from the manner in which it was employed, must have been in common use long even before 1731." The distinction between grades of nurses is naturally ignored by British Tommy and Jack in the present war; thus a book of this year, being a collection of tributes of gratitute by sailors and soldiers, is entitled "Thank You, Sister."

Alfred Ela.

APPOINTMENTS.

Dr. Thomas B. Smith, of Lowell, has been appointed medical examiner for the fifth Middlesex District to succeed the late Dr. Joe V. Meigs. He has been a practising physician in Lowell for the past 23 years, and has been assistant medical examiner for the district since January 22, 1913.

Dr. Joseph W. P. Murphy, of Peabody, has been appointed a member of the visiting staff of the J. B. Thomas hospital, Peabody.

Dr. Isaac G. Rosenberg, of Dorchester, has been reappointed trustee of the Children's Institutions Department.

Dr. William H. Blanchard, of Charlestown, assistant surgeon of the Fifth Regiment, has received an appointment as surgeon at St. Elizabeth's Hospital.

Dr. James E. Waters, bacteriologist and physician of the Board of Health, of Gardner, has been appointed visiting physician of the David Parker Hospital.

The Board of Health in Greenfield has created a new office this year, medical agent, to which *Dr. Clara M. Greenough* has been appointed. This officer will have charge of all quarantines and other detail work and the general supervision over all cases of contagious disease taken up by the board.

MARRIAGES.

Dr. Allen Greenwood of Waltham was married, on March 8, to Miss Hope Hazel Whipple of Pawtucket, R. I.

Dr. Charles Hammett Rogers, Newport, R. I., was married on March 7 to Mrs. Victoria Ragsdale Darrah of Battle Creek, Mich.

Dr. Marian Hague Rea, a practising physician at the Boston Psychopathic Hospital, was married on March 2 to Dr. Baldwin Lucke, a pathologist at the University of Pennsylvania Medical School, in Philadelphia. Dr. Rea will retain her maiden name.

Dr. Earle Lattimer Johnson, of Pittsfield, was married recently to Miss Henrietta Ferris of Albany. Dr. Johnson is an alumnus of Tufts College.

DR. HERMAN M. ADLER, formerly associate professor of psychiatry at the Harvard Medical School and director of the Psychopathic Hospital, was married on March 17, to Miss Frances Porter at Hubbard Woods, Ill. Dr. Adler is now head of the psychopathic department of the Chicago Juvenile Court.

NOTICE.

HARVARD MEDICAL SCHOOL.—The Cutter Lecture on Preventive Medicine and Hygiene by Ludvig Hektoen, director, Memorial Institute for Infectious Diseases, Chicago, on A Discussion of Poliomyelitis in the Light of Recent Observations, will be given Tuesday, April 3, 1917, at the Harvard Medical School, at 8.15 P.M.

These lectures are given annually under the terms of a bequest from John Clarence Cutter, whose will provided that the lectures so given should be styled the Cutter Lectures on Preventive Medicine, and that they should be delivered in Boston, and be free to the medical profession and the press.

All members of the classes in the Medical School, the medical profession, the press and others interested are cordially invited to attend.

SOCIETY NOTICES.

ESSEX SOUTH DISTRICT.—The fifth regular meeting of the Essex South Medical Society will be held at the Danvers State Hospital, Thursday, March 29, 1917, at 3 P.M.

Dr. MacDonald, the Superintendent, has arranged a special program and clinic for the Society, an outline of which follows:

1. General Statement. Dr. John B. MacDonald.
2. A Consideration of the Arterio-sclerotic and Senile Psychoses. Dr. William J. Thompson.
3. Symptomatology and Diagnosis of Organic Brain Disease—Brain Tumors, etc. Dr. David T. Brewster.
4. Pathological Résumé. Dr. Lawson G. Lowrey.
5. General Discussion.

DR. E. POIRIER, *President.*
DR. H. P. BENNETT, *Secretary.*

NEW ENGLAND PEDIATRIC SOCIETY.—The forty-eighth meeting of the New England Pediatric Society will be held in the Boston Medical Library, Friday, March 30, 1917, at 8.15 P.M.

The following papers will be read:—

1. "Studies in Infant Feeding: The Mineral Constituents of Milk." Henry I. Bowditch, M.D., and Alfred W. Bosworth, Boston.
2. "Anemia of the Newborn." Karlton G. Percy, M.D., Boston.
3. "Nephritis in Childhood, with Especial Reference to Functional Tests." Lewis W. Hill, M.D., Boston.

Light refreshments will be served after the meeting.

MAYNARD LADD, M.D., *President.*
RICHARD M. SMITH, M.D., *Secretary.*

RECENT DEATHS.

EDWARD S. PARKER, M.D., house physician in Memorial Hospital, Pawtucket, R. I., died recently at his home in that city. Dr. Parker was born in Derby Line, Vt., and graduated from the Harvard Medical School. He was a member of the Rhode Island Medical Society and the Pawtucket Medical Association. He is survived by his widow and one son.

THOMAS EDWARD CUNNINGHAM, M.D., died at his home in Cambridge, February 27, 1917, aged 66 years. He was born in Prince Edward Island, Jan. 5, 1851, was a graduate of the Harvard Medical School in 1883, had been a fellow of the Massachusetts Medical Society since 1877, and was physician to the Holy Ghost Hospital for Incurables from 1895 to 1900. He is survived by a son who is a physician.

DR. FRANK J. HOGAN, who died in St. John, N. B., March 8, was a graduate of Harvard Medical School in 1908. He practised in Bridgeport, Conn., for two years. He went from there to St. John, N. B., where he had attained considerable success. His death occurred after a brief illness from pneumonia.

DR. GEORGE C. BLAISDELL, who died at his home in Contoocook, N. H., March 5, was born in Goffstown, Nov. 23, 1844. He was graduated from Harvard Medical School in 1867. He is survived by two brothers.

DR. JUSTICE C. FRENCH, who died in San Diego, Cal., recently at the age of 65, was born in Harwick, Vt. He was graduated from Harvard Medical School in 1875. He is survived by his wife.

DR. JOSEPH TAYLOR, who died at his home in Manchester, N. H., on Saturday, March 10, was born in Dublin, N. H., August 11, 1860 and was graduated from Dartmouth Medical School in 1894. He first practised medicine in Acworth and before coming to Manchester practised for a time in Bedford. He has resided in Manchester for sixteen years. Apoplexy is given as the cause of his death. He is survived by his widow, two daughters and two brothers.

DR. ARTHUR ELLSWORTH MERRILL, a Fellow of the Massachusetts Medical Society, dropped dead in the gymnasium of the Somerville Young Men's Christian Association while playing basket ball, March 17. Dr. Merrill was born in Parsonsfield, Maine, 51 years ago, was a graduate of Bowdoin College and the Long Island College Hospital, and had been prominent in athletics and in church activities in Somerville, where he had practised for twenty years. He is survived by his widow.

DR. HENRY L. COIT, well-known as a pediatrician and a leader in the certified milk movement, died at his home in Newark, N. J. on March 13. Dr. Coit was born in 1854, in New Jersey, the son of Rev. John Summerfield Coit, and received his early education in the public schools of Newark. In 1876 he graduated from the New York College of Pharmacy and later from the College of Physicians and Surgeons of New York. He returned to Newark and began practice in that city. In 1893 he organized the first medical milk commission in this country and was first president of the American Association of Medical Milk Commissions, an association with branches in twenty-three states, one in Canada and several in Europe and Asia. He was president of the International Society of Goutte de Lait, with headquarters in Budapest.

Dr. Coit was a Fellow of the American College of Physicians, Inc.; a member of the American Pediatric Society and founder of the branch of that organization in New Jersey; a member of the New Jersey and the Essex County medical societies and of the Practitioners' Club of Newark; member of the Society of Colonial Wars, of the Essex Club of Newark and of St. John's lodge, of the Masons, of Newark.

He is survived by a widow, three daughters and one son.

DR. OCTAVIUS KING YATES, of West Paris, Me., died on Sunday, March 18, from a paralytic shock. He suffered a shock about two years before which paralyzed his lower limbs, but his mind remained bright and keen. He was about 87 years of age. He was graduated from the Medical School of Maine, at Bowdoin College, in 1871. His widow survives him.